SUPPLEMENT.

The Mining Journal,

LWAY AND COMMERCIAL GAZETTE:

RMING A COMPLETE RECORD OF THE PROCEEDINGS OF ALL PUBLIC COMPANIES.

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iginal Correspondence.

OF ENGLAND IRON TRADE—No. III.

W AND VAUGHAN'S WITTON PARK WORKS.

ironworks were established by Messrs. Bolckow 46, although previous to that date the firm had ars the manufacture of finished iron at Middles- ith general foundry and engineering work. The g adequate and regular supplies of pig-iron was that actuated the firm in commencing smelting nd they fixed upon that site because they had t to them of obtaining a full and excellent sup- the coal field near Bishop Auckland. In these were, however, disappointed. They had the obtaining anything like ample supplies of iron- consequence of this fact that Mr. Vaughan's at- the practical man of the firm all matters of a left to his disposal—was turned to the Cleve- e of supply. Says Mr. Isaac Lowthian Bell:— ge detached masses which had fallen from the cliff led o Skinningrove, on the coast, at which place, to their sur- ed thickened out from 4½ ft. to nearly 14½ ft., and that iron it contained 31. So far was accident, but that firm, nconvenience arising from an exposed place of shipment, 1850, the position of the ironstone inland."

the commercial importance of the main bed firm took a lease of the royalty at Eston, be- tees of Lady Hewley's charities. Previous to , Mr. John Marley, of Darlington, who was con- ineer to the firm, being of the opinion that the ne lay in the vicinity of Eston, entered into cor- he late G. W. Jackson for leave to search for iron- leases on Messrs. Bolckow and Vaughan's behalf. d was that the estate had been well tested for lifetime of Mr. Jackson's father, and that he n "to ruin Messrs. Bolckow and Vaughan, and Here is an opportunity for moral reflection! es on Lady Hewley's estate, the firm whom Mr. t assist to ruin" projected the Eston Branch nected their mines with the main line of the gton Railway. Until this line was finished the s had to be carted to Cargo Fleet. But, with prise, Messrs. Bolckow and Vaughan pushed rapidly that, although it was only commenced was publicly opened on January 6 following. ne of the most auspicious and important that e in Cleveland. It was attended by all the lead- e district, and the proceedings, which included mines, were of a very interesting character. It d that the Eston Mines should yield 1000 tons llowing year (1851) instead of the 52,000 tons than 187,950 tons were wrought and vended. requirements of the firm increase, that in 1856 0 tons per week were turned out. The present per day.

the Witton Park Ironworks, which are situated d, being less than 4 miles from Bishop Auck- a great natural hollow, which the channel of as to form a crescent. It is doubtful whether for the works could have been found within the Durham coal field, thus showing the rare of the man who selected it—Mr. John Vaughan. o, the site has commanding advantages, for, in lose to the Wear, which provides an abundant oins the richest part of the Durham coal field, ccess of the limestone measures of Weardale. Vear answer the purposes of a "tip" for the nd the railway facilities of the district are so ant of proximate shipping accommodation is tation of Etherley or Witton Park, on the Stock- Railway, is within 50 yards of the works, which sing a net work of railway lines, all converging ocus—the blast-furnaces or the rolling-mills. We pany employ a wire-rope to take down a great ils, and remove their iron to its place of desti- pe trains of 30, 40, or 50 wagons are taken up of 45° with the utmost ease and safety.

et furnaces at Witton Park. Four of them are 4 ft. diameter at bosh, and have each four tuy- rnace, which has only recently been erected, is 5 ft. in bosh, and is fitted with six tuyeres. The the smaller furnaces is between 14,000 and 15,000 he largest one being 26,000 ft. The temperature from 400° to 1000°. The high temperature of tained at most of the other works in Cleveland mpossible of attainment at Witton Park, because aracter of the heating stoves employed. These built on the old-fashioned plan, and although ably improved in some particulars when the ere reconstructed, a number of years ago, it is t the most of the new and improved stoves used strict have been introduced. Arrangements are g made for substituting Godfrey's patent stoves present in use. Mr. Godfrey is an official in the ers. Bolckow and Vaughan, and his stoves have ced at their Middlesborough and Eston works factory results. Their chief peculiarity is the rough which the blast has to pass and repass furnace, and they maintain with the utmost ease re of 1000°. There are 28 pipes in each stove. The he waste heat from the furnaces is in operation the cup and cone apparatus employed is similar dopted in Cleveland. The first furnaces built nly 42 ft. high by 15 ft. diameter at the bosh, furnaces were all reconstructed, and raised to 4 in. at the boshes. To Mr. Vaughan the credit aken the first decided step in the direction of ht of the blast-furnaces of Cleveland—a step followed by every firm in the district.

Forge pig is the principal quality made at Witton Park. Four furnaces are making this kind, whilst the fifth furnace—the new one—is now employed in making Bessemer iron, which is chiefly absorbed by the company's steelworks at Manchester, although a good deal is also purchased by Sir John Brown and other steel making firms at Sheffield. The present output of this furnace is about 400 tons per week. There is no Cleveland mine used for Bessemer iron, nor is the ordinary limestone employed. A combination of Spanish and Cumberland hematites, and the finest lime as a flux are the raw materials used. This accounts for the enhanced value of this kind of iron, which is generally double that of ordinary pig. The average production of each of the Witton Park blast-furnaces for the year ending December 30 last was 303 tons per week, or 1515 tons weekly for the whole. The following is the relative proportions of raw materials used in producing a ton of Witton pig:—

Coke	Cwts.	23	0 5
Limestone		6	2 24
Cumberland red ore		7	1 7
Spanish hematite		3	1 7
" "		3	2 19
" "		0	3 7
Cleveland ore		15	0 19
Mill Cinder		7	1 9

The total quantity of raw material used in the blast-furnaces for the 12 months ending December 30, 1872, was 298,787 tons. The totals for a recent week are as follows: Limestone, 1023 tons 15 cwt.; Cleveland ore, 1982 tons 4 cwt.; cinder, 927 tons 3 cwt.; hematite, 1154 tons 14 cwt.; Spanish ores, 1450 tons 16 cwts.

The mechanical appliances in operation, although highly serviceable, contain no particularly novel features. The hoists are worked by hydraulic power, and there are four steam-engines employed to raise the blast. The largest of these is a pair of coupled beam engines, having a steam cylinder of 40 in., and a blowing cylinder of 100 in. They were built about two years since by the company at their Middlesborough works, but they have only recently been put into blast. Another beam engine has a 36-in. steam cylinder, and a blowing cylinder of 96 in. A third engine—the oldest on the works—has a steam cylinder of 27 in., and a blowing cylinder of 5 ft.; while, last of all, there is a pair of horizontal engines, having blowing cylinders of 4 ft. and steam cylinders of 18 in. The latter engines were built by the well-known firm of Cochrane, Groves, and Co., of Middlesborough.

THE ROLLING MILLS at Witton Park are three in number, and are separated by a wide space of ground, intersected by tramway lines, from the blast-furnaces. The oldest of the rolling-mills was put up shortly after the first of the blast-furnaces, between 1847 and 1850, and is now rather dilapidated in outward appearance. But it still remains the largest mill of the three. There are altogether 110 puddling furnaces, 55 being in one forge, 19 in a second, and the remainder in the third. The third forge is of quite modern date, having been built within the last four years. The average yield of the whole works for 1872 was 1067 tons 13 cwt. per week of finished or puddled iron; of "rough down" the weekly make was 275 tons 3 cwt.; of rails, 615 tons 4 cwt.; and of plates, 243 tons 13 cwts. It will thus be seen that the manufacture of rails is carried on to a very large extent at Witton. No rails are made below 50 lbs. per yard, and from that up to 84 lbs. are the standard specifications. At the present time, and for two or three years past, the company have large orders on hand for Russian railways. Ship and boiler plates of all kinds are also made at Witton, but the angle-iron manufacture is confined to the company's works at Middlesborough.

There are altogether 10 steam-hammers at Witton, the largest being capable of striking a blow equal to 6 tons. Five of these are nailers; the rest are Bowling hammers. The nailer hammer is self-acting, and posseses several manifest advantages over the Bowling hammer, which is now considered an old-fashioned tool, and is becoming obsolete. There are altogether eight mills in operation, three of them—one rail and two plate—being in No. 1, or the oldest forge; while the other three are in No. 2 forge, and two in No. 3. The largest size of rolls used is 14 in., the smallest 5 in. The machinery in No. 1 forge is actuated by a horizontal double engine of 35-in. cylinder and 100-horse power; in No. 2 forge by a similar kind of engine, 60-horse power; and No. 3 forge by another pair of horizontal engines of 40-horse power combined. There are foundry and engineering premises adjoining the works, for the repair of the machinery; and the total number of hands employed about the place is upwards of 2000, while the average amount of wages paid is 3000*l.* per week. Within the last six months the blast-furnace men at Witton Park have received an advance of 10 per cent.

COAL MINES REGULATION ACT, 1872.

SIR,—Your last week's correspondent misapprehends to some extent my meaning. The special rules I referred to were those made under the *former* Act; and a few words will explain why. Section 31 of the new Act requires the Secretary of State to issue a "certificate of service" to whomsoever satisfies him that he has* "acted in the *capacity* of a manager of a mine." Now, the best proof—though by no means the only proof—that any given man *has* thus acted, seems to me to be the special rules in force hitherto. If such rules speak of a given person as "manager" (I mean a person performing certain functions therein indicated), there seems a very strong—and almost irresistible—argument that whoever can show that he has performed those allotted functions has "acted in the capacity of manager" within the language and the clear meaning of section 31. I, therefore, suggested that if any such person had been refused a certificate of service he should bring the facts of his case to the notice of the Home Office.

The Secretary of State for the *very* reason that the Act confides to him the exercise of opinion in a matter of importance (without expressly giving any power of appeal from his refusal) may be expected to act with an anxious desire to refuse no one who can, by reasonable construction, be considered entitled to this franchise. Another circumstance, also, might be supposed to guide the action of the Home Secretary—viz., that whereas no mine can be worked without a manager, and whereas a probationary manager may act until he has had opportunity of obtaining by examination a certificate of competency, and this probationary manager *may* be one who has had not one day's experience in the working of a colliery; it would seem very desirable to limit, as much as possible, the confiding to these "'prentice hands" the performance of a function which the Act regards as (and which in fact is) an important one, and one moreover for which actual practice in a mine is as important as is practice in a ship to a sailor. JOHN WILLIM HALL.

Bilston, Feb. 12.

* Of course during the period there mentioned—viz., either, 1. For a period not less than 12 months during the five years before the Act; or, 2. Before the passing of the Act (which passed on Aug. 10, 1872) *and* since (how long is not said), so that, in strictness, an acting as manager on the 9th, 10th, and 11th August, 1872, but neither before nor since, gives the right to a certificate.

COAL BASINS OF THE MISSISSIPPI VALLEY.

SIR,—Ten States in the Mississippi Valley are part underlaid by bituminous coal veins, Illinois and Kansas containing the largest area of coal measures. The Mississippi, Missouri, Ohio, Illinois, and Wabash rivers follow the principal lines of anticlinal axes that divide the basins of this great contineutal coal field, the branches of these rivers follow the branching and lesser lines of axes. The dip of coal measures is from these rivers, and their branches to the centre of the watersheds between them. The amount of dip is governed by the distance between the lines of axes; where these are of the same magnitude the greater the dip, and *vice versa*.

The Illinois Central Railroad crosses the great Illinois coal basin north and south 230 miles. The Chicago branch 75 miles. This basin is shafted on its north edge at Lasalle, and three coal veins of the aggregate thickness of 15 ft. are being worked; depth of veins, 125, 220, and 425 feet. Also, is shafted along its southern edge at Duquoin, Big Muddy, and other places. The Ohio and Mississippi Railroad cross this basin east and west 150 miles. The Chicago, Alton, and St. Louis Railroad 175 miles, St. Louis, Vandalia, and Terre Haute Railroad 230 miles, Indianopolis and St. Louis Railroad 225 miles, and St. Louis, Jacksonsville, and Chicago Railroad 175 miles. The other railroads of Central and Southern Illinois cross these coal basins. The Hannibal and St. Joseph, North Missouri, and other roads cross from 20 to 100 miles over coal basins. All the roads of Central and Southern Kansas cross from 50 to 100 miles over coal basins. The railroads of Central and Southern Iowa cross largely over coal measures. The railroads of Indiana, Ohio, Kentucky, Tennessee, Western Virginia, and Western Pennsylvania crop considerable distances over coal veins. The dip of these coal basins varies from 5° to 15°, with a plane of the horizon; the wider the basin the less the dip, and *vice versa*. The dip of the small basins, as it were, converges and empties into the larger basins, their dip being *qua qua versal* (turning inwards from all sides). The elevating forces that disturbed and tilted these coal measures have been of a very modified character, so much so that with the deep clays covering the strata along the flange of the basins the casual observer would fail to discover any dip whatever, and a miner would only notice it by the water flowing towards the forehead of his gallery, when that was run at right angles to the nearest water-course.

The position of coal veins being now worked to the towns and cities along the Ohio and other rivers of the Mississippi basin are as follows:—Evansville, Ind., 120 ft. below; Leavenworth, Kansas, 700 ft. below; Stubenville, Portsmouth, Wheeling, Pittsburgh, St. Louis, Alton, and Rock Island, from 10 to 100 ft. above the river. All the towns and cities of Central Illinois, Southern Iowa, Western Missouri, and Eastern Kansas are built on the edges, in the central part, of coal basins. These coal measures are 500 miles wide east and west, and 250 miles north and south. The same general character of veins being found at the croppings of these basins leads to the conclusion that the flora of coal plants grew over large areas, and were laid down in successive eras. That the present area of this coal field subsided and was elevated alternately, and by that means the shales, sandstones, and limestones below, between and above the coal veins, were deposited on the floors of shallow oceans. This takes place prior to the abrasion of the valleys now forming the river systems.

When that era had arrived the coal measures were a friable, tabular mass of strata, with plants uncarbonised, and elevating and abrading forces (supposed crystalline below and water above). Take hold of this tabular mass, as the sculptor the block of marble, and, by the action of these two forces working in concert (see my third law—the elevating and abrading forces have acted along the same line, and with corresponding degrees of power) have tilted the coal strata in basins, formed the mechanical structure of coal measures, carbonised the coal plants, and perfected the topography of coal fields, the spring and drainage systems, and forming of faults to divide the coal basins in water-tight compartments—dykes of porphyritic rocks to cut through the coal measures, forming natural dams to hold the water circulating in one district from that of another—and place the coal in an economical position to mine, are effects due to the operation of these working laws.

The amount of coal measures abraded along the line of the Missisippi, Missouri, Ohio, Illinois, Wabash, and other lesser rivers that cross these coal fields ranges from 50 to 500 feet vertically. The width of coal veins cut away along the line of these rivers varies from one to twelve miles. Opposite St. Louis the coal measures have been abraded 300 feet, and coal vein cut out seven miles wide that at one era connected what are now the Illinois and St. Louis county coal basins.

The coal along these lines of anticlinal axes, cut out to form the valleys of rivers, includes about 5 per cent. of the whole area of coal measures. The coal is supposed to have been fired by spontaneous combustion, and exposed portions smouldered away as the eroding action of air and water crumbled its enclosing strata. Dr. Kane found lignite basins being abraded and burning along their outcrops in the arctic regions, which fact suggested the idea of our great continental fields having been fired, and croppings changed to smoke and ashes, the proper elements to produce cereals.

When we run the eye down the stream of time from the date when Cæsar landed among the rude Islanders of Britain, to Saxon heptarchy, Danes, King Alfred, and Magna-Charta, to the commencement of the coal and iron age of the island, and see the rapid development of the United Kingdom since that era, we realise that the "Iron Duke" was a verity, and backed by the coal and iron fields of his native isle, was enabled to overthrow Napoleon in his grand attempt to establish the fourth great empire. Each ton of coal when changed to steam, is equivalent to a certain amount of muscular force, each ton of iron ore owned by a nation is equal to a certain number of soldiers. The Russian bear and English lion have their

feet planted on coal and iron veins, the latent force of which had not been estimated by the adventurous Corsican at Moscow or on the field of Waterloo.

As a nation, the American has barely commenced to realise the influence of the coal and iron here stored in an economical, military, or political point of view. The iron and coal age of the country has barely commenced. The Creator in his kindness has here massed in coal, iron, and other mineral wealth the elements of a people of great wealth and power; and if we are true to ourselves the future looks encouraging, and the American eagle can plume his wings and be able to hold his own in the coming times, and be known in the heraldry of nations. JOHN VAN CLEVE PHILLIPS.

Dubuque, Iowa, Jan. 19.

COAL MINES ON THE ANDOEN, IN NORTHERN NORWAY.

SIR,—The "Tromsöposten" gives the following information:—The borings for coal at Ramso, on the Andöen, are now totally concluded. It is not reported how far the search will give a hope of future permanent works, but it is certain that Mr. Dahl, the Superintendent of Mines, is so far satisfied with the search that he intends to lay before the coming Storthing (Parliament) a proposition to get up a trial work, and also, if this should not be sanctioned, he will have some capitalists in reserve, through whom the work will be set going.

As it will be remembered, the boring itself has been very unfortunate, as there have been five or six borings at Ramsaa, at different places, but only once they succeeded in reaching the stratum of coal, at a depth of 400 N. feet; the other borings having stopped by the bores breaking, or by some other mishap. The last boring reached, without any essential mishap, to a depth of 250 N. feet, when the manager of the works, a short time since, received orders to stop. The stratum of coals was not reached at this last trial, as it was supposed that it would lay much deeper than at the first place where it was found. The locality at Ramsaa is in many respects unsuccessful, as the layers of earth and stone are not level, but arched with a very large angle of conjugation. The stratum of coal of which the uppermost, in the middle of the marsh, is supposed to lay more than 400 N. feet deep, stretches itself along the foot of the mountain behind the marsh, and right up to the surface. Before that several borings had been made, thereby controlling the regularity of this angle; single borings cannot give trustworthy results as to the richness of the layers of coal. With the one bore by which the deepest sinking was attained 10 layers of coal had been got through, of which the most were thin targets, while the lower ones of 20 and 7 inches are lying so near each other that they can be driven together. The next profitable layers to these is some distance above, and of 12 N. inches, and contains a very rare sort of coal, which is so oily that the smallest lump will burn with flame by being lighted with a match. This is a very peculiar and good sort, similar to what in England is named "Cannel coal," while the above-named layer of 27 N. inches contains the superior "Boghead coal," although a little sulphurous, and is considered to be the best "gas coal." At common market prices it has a value of 1 species-dollar per barrel. On account of the bent situation of the layers it is, as before stated, difficult to depend safely upon what the one bore tells of the richness of them, especially as those which protrude beyond the surface at the foot of the mountain have a thickness not differing much from what has been found by the boring. There is, under the mountain and lying behind the others, an eleventh layer; it is 15 N. inches at the surface, rich, and contains, what none of the others do, excellent steamship and factory coals. If the layers continue to be what the borings respecting it have promised, there can be dug out millions of barrels of coals from the Ramsaa marshes and environs, but then there is for the coming mining still another inconvenience. The whole east coast of the Andöen, as far as Riso harbour, is an open foreland, where the Andsea is going in with a heavy sea right from the Arctic Ocean. There must, therefore, be built, at great expense, a superficial harbour, for which there is hardly enough stone to be got, even if moles could be got up that could withstand the heavy rolling seas; or there must be built a railway to Riso harbour, a distance of 2 or 3 N. miles. Both of these enterprises will cost the same, as the territory for a railway enterprise along the flat coast is very favourable, but the latter would, perhaps, be safer. A third inconvenience connected with the coal mines at Andöen can be named—all the required workings will be very expensive. Besides, while boring for coals, several valuable minerals were found, which will yield profitable subordinate products when the works are set going—viz., fire-clay, very rich ironstone, and red sandstone for building purposes. To judge from the results of the borings, the coal mines at Andöen will not be of much service in supplying the steamships with fuel on their journey past the place, which otherwise would have given the discovery an immediate and momentary use. On the contrary, there is supposed to be enough gas coal to supply all the streets in Norway with gas, and more still. As the transport to most of the places of consumption is considerably longer than from England, and as such a voluminous article cannot bear a high freight, turning it into a ware of more value at the place would, no doubt, be the best use of the coals. Gas is, however, as we know, an impossible article of trade, and instead of this the coals can be made into oil. Paraffin oil can, also, very easily be made from the Andöen coals. This, I have heard, is Mr. Dahl's plan for using the coal. Up here, where so much lighting liquid is necessary, there is no doubt that a paraffin oil factory would pay remarkably well, the situation of which would save some of the transport expenses, and especially now, as the factory of Mandal is closed.

With regard to this coal affair I shall only add that Mr. Dahl has, during his visits to our part of the country received the impression from the form of the country, and the nature of the stratum of the earth, that the soil on several of our islands must contain layers of coal. It is known that on the Andöen itself a mineralogist from Tromsö presumes to have found coal further south, in the parish of Sogn, not far from the Riso harbour. Of this discovery, however, no further details have been heard. C. J.

Drontheim.

REPLY OF AN ENGLISHMAN TO AN AMERICAN'S VIEW OF MINING IN CORNWALL.

SIR,—I was not at all surprised on reading the letters of Mr. Baker—or Judge Baker, as he is called here—on the Tin Mines and the Machinery of Cornwall, as I am well aware that the Americans think there is no machinery in the world equal to their own, nor any mechanics equal to themselves. Therefore, I did not expect anything better from him on that subject. But on reading his letter in the Supplement to the Journal of Dec. 21, on the Cornish Miner, I was taken by surprise, and I cannot but think that "the Judge" is getting crazy, or as the Yankees term it, going out of his head, or that he is quite ignorant of all mining and machinery both in this country and in England, for no man that has judgment and common sense would say what he has in reference to the Cornish Miner in this country, and I hope you will allow me to correct a few of his misrepresentations through the Journal. In the first place, he says "an intelligent engineer introduced the One-Hand Drill, and Giant Powder, and the Cornishmen intrigued against it, and struck work." Now, Sir, this statement is quite wrong, as the Cornishmen did use it, and continued to do so, until they were satisfied it was nothing better than the Black Powder, for the ground they were working on, and during the time of its use one man was killed and another severely wounded, who, I believe, is now in Cornwall, a cripple for life. With regard to the saving of 30 per cent. by using this powder it is quite a delusion, as I am well acquainted with the celebrated engineer referred to, and he has repeatedly told me that there is nothing saved by its use, unless it is in wet and very hard ground, and his men have their own choice to use what powder they think proper. So much for "the Judge's" misrepresentations.

Mr. Baker says the Cornishmen, as a body, resist every modern improvement, and which is very needful and beneficial for them to do in this country, as I fear if there were no one to oppose some of the Yankee notions that are suggested by some of the American agents all the money would be thrown away in experiments on the surface, and not a dollar spent in developing the mines, which has been the case in a great many instances, which now remains to be seen. "The Judge" then says they clan together, lease the mines, and rob them right and left, doing damage to property that will cost millions to repair. Allow me, Sir, to ask Mr. Baker what this country and Central City would be at the present time if it had not been for the Cornish miner? Leasing and working the mines after the American experts have spent all their capital, and ruined the mines, thousands of dollars in debt, the Cornishmen have taken them on lease, and paying from 15 to 30 per cent. of the gross proceeds, and all other working cost, and have made the mines pay handsome profits to themselves, in addition to fair wages. And I may tell you, Sir, that there are only two mines working in this district by public companies—the Brigg's claim, and the Levitt, the latter mine having been abandoned through poverty for years, and then leased to an Englishman, who made a profit of about $50,000, besides paying a high percentage to the owners; and in the Nevada district there is only one mine working by a public company, and that is an English one, on the Kansas lode, all the other mines being leased to Cornishmen, who are paying a high percentage, and making beyond fair wages, which the American experts could not make pay, and abandoned them through poverty.

Sir, it would be a waste of time and space in your valuable Journal for me to enter into the particulars of all the mines now working on lease by Cornishmen; but you will, no doubt, allow me to give the names of a few that are working to a large extent, and in a miner-like manner, much better, indeed, than they have ever been worked by the American experts—that is, the Irish Bobtail, Narragansett, Consolidated Gregory, Gunnell, U. P. R., Notaway, Kent County, and many others too numerous to mention, all of which have been abandoned by the American experts because they could not make them pay. Sir, I should be very thankful to "the Judge" if he could show us, through the *Mining Journal*, one mine worked by a public company that has ever paid $1 per share profit to the shareholders, with all their excellent machinery, and experts in management. Perhaps, Sir, he is prepared to show by figures that the Union Mining Company has made large profits on the Bates' lode, and if this is so, I think it would be more like business to have paid their debts before showing a profit, in figures, to deceive the public.

Mr. Baker also says in some instances the Cornishmen have been a benefit, and in others they have been an obstruction and a hindrance. I should presume by this statement, and the character he has given them, that where they have been a profit it has been in connection with the American expert in puffing up property for sale to deceive the public. And when they have been an hindrance it has been in trying to put a stop to anything but fair, honest, and legitimate transactions in mining.

In conclusion, let me tell Mr. Baker that there are Cornishmen in Colorado who can work mines as they should be worked, and make them pay profits, after the American experts, with all their superior machinery, have abandoned them through poverty, and who will also be a hindrance and an obstruction to anything but honest and legitimate transactions in mining and practical management; and when this is carried out the mines of Colorado will not be second to any other mining country for profits. ARGUS.

Central City, Jan. 17.

FOREIGN MINING INVESTMENTS.

SIR,—It is but natural that a great deal should now be said adversely to American mining. It is so common to shift the blame for pecuniary failures in almost all enterprises from the promoters to some alleged unforeseen circumstances connected with the enterprises themselves, that it is rather to be expected than otherwise that such should be the case.

Whether men act according to the dictates of prudence in the prosecution of their business or not, their failing to succeed will be by themselves attributed to anything rather than to their own oversight. Those who act according to the best of their judgment generally flatter themselves that no one in the same or similar circumstances could have done better. And can it be successfully disputed that there is not some sort of rational foundation for such a conclusion? Where the convictions of the mind are honestly appealed to, and respected in the prosecution of duty, it must always be exceedingly difficult, if not impossible, to convince the individuals so acting that the best had not been done which could have been done under the circumstances. If errors may be pointed out in the manner of prosecution of certain complicated works after the issue has been fully wrought, and cannot be repeated, it may in most cases be successfully contended that such errors could not have been foreseen, and would not have been conjected if the course pursued had not resulted unsuccessfully, and which of itself affords the strongest, if not the only, proof of such errors. But can this be alleged in respect of recent mining enterprises in America? Is the assumption tenable that the best has been done which could have been done either before or subsequent to the purchase of most of the mines? I answer, No. And every thoroughly experienced miner who has seen the various popular enterprises of English capitalists in the Western States of America would bear me out in what I say.

How are such errors—to call them by no harsher term—to be accounted for? Is English mining knowledge of such a type that it cannot discern between one thing and another, that it does not know the difference between country rocks and vein matter, or the huge disparity which there is between a true fissure vein and a mere casual deposit in a limestone cavity? It has been feebly attempted from time to time in the columns of the Journal to prove the permanent value of limestone deposits by the exceptional non-productiveness of true fissure veins, but such a use of the *ad absurdum reductio* style of logic savours too much of clap-trap, and cannot but be—beyond very narrow limitations—eminently unsatisfactory, if not absolutely futile. But whatever differences of opinion may arise on such matters, it will not be very easy to paliate, much less to excuse, official action when resulting so unfavourable to the interests of mining in general, and of those in particular which it had undertaken to protect. It would have been no sufficient excuse if even the best mines had been secured at such enormous rates, far exceeding all others for similar properties, but such has not been the case, and the anomaly is indeed perplexing; probably more so to one who is acquainted with the state of things in many of the districts where the mines are situate than to those who have no personal knowledge of the nature of the country, the local manners and customs of the people, and the state and condition of the mines. It may be discredited, but it is nevertheless true, that there are mines and districts of great value which are utterly neglected, and for no other reason, apparently, than that they may be purchased cheaply, and lack the pre-requisites for sensational purposes.

There are some districts in Nevada—at least I know of one—where the geological order of the rocks is as regular and well pronounced as it is in Cornwall, covering several square miles of surface, and containing, to my certain knowledge, scores of well-defined lodes cropping to the surface both in the granite and superincumbent rocks, slates, &c., many of which are large and well-defined lodes, 8 ft., 10 ft., 12 ft., and sometimes more in width, containing, in some instances, sulphides and chlorides of silver in paying quantities close up to the surface, well wooded, and might be purchased outright for a few thousand pounds; but because the spirit of enterprise is so vitiated and demoralised, and parties cannot see their way clear to step in and at once make an astounding display by enormous returns of bullion previous to incurring the necessary expenditure in opening the mines, they turn away, and seek for some spurt in the limestone formations, which are too often mere cavities filled in some incomprehensible manner with, in some instances, more than average quality silver ores, but which are, as a matter of course, soon extracted, and, "like the baseless fabric of a vision," leave not a trace behind.

I do not think that equal advantages are afforded by any State in the world for making so much money by legitimate mining as in Nevada, but mining in a legitimate manner must be prosecuted—there as here—on sound business principles. The mines must be opened and properly worked, shafts sunk and levels extended, winze communications effected, and a regular system of overhand stoping pursued. But to affirm that more than a moral certainty can ever attach to undeveloped mines would be to go beyond the reason, and no sensible person would give credence to tions if made; but judicious selections of mining made there which never fail to inspire men of rience with the most lively enthusiasm and unwa in their value, and, consequently, in the results of ments. The brightest prospects, it is well known, able from the shadows of doubt, but in respect of districts as those to which I refer such shadows are than the reflex of mere possibilities.

Many things are in favour of Nevada mining estimated and embraced, would go far to ensure In the first place, there are the advantages of sha in some instances, of mining to considerable depth ing the expense and inconvenience inseparable to mines. In the second place, there is no royalty or Thirdly, wood for fuel, and a great deal for mining growing on and belonging to the mines. Fourthly, selves are much more valuable intrinsically and mines usually are; and, lastly, the comparatively such mines may be purchased. It will be useless to if there are such mines with such advantages in Nevada enormous sums have been paid for comparatively To such interrogations I can only reply that the mate mining appear to have been utterly disregard berately set aside, and superficial deposits in trenches been too highly esteemed, simply because a displa for some purpose other than that of legitimate not my intention to assign reasons for the motives prompted others, my object is to deal with facts as I know them, and to state what is in opposition to alleged because of so many disappointments.

Liskeard, Feb. 12. ROBT.

FUEL-MAKING MACHINERY.

SIR,—Everything relating to this subject at the interesting, and, therefore, if an article in your for it, I should scarcely deem an apology necessary ing you and requesting space for my letter in your My attention has been called to your recent comm you call an invention of Mr. Lodge, of Whitecraft for improvements in machinery, or apparatus, for &c., of which you proceed to speak. First, as machine a rotatory horizontal table, with a number reception of fuel to be compressed. Secondly, stat volves by a ratchet motion the moulds are brought a vertically moving block, which forms the bottom being, connected with a weighted lever, affording pressure of a plunger worked in an overhead shaft, as each block is pressed it passes on underneath plunger, which descends and pushes it out on an e carries it away. I have thus briefly epitomised the features of Mr. Lodge's alleged invention, that you with them the specification of a patent (a copy of herewith) taken out by Mr. F. J. Hamel, and which features, and much more, in a vastly superior manner. machine, you will see, also consists of a horizontal containing a number of moulds, 6, 9, 12, or any multi one bed to every three moulds or cavities, so that, as volves, each comes in succession over one of these tain vertically moving blocks, or rising plungers, a ance to descending or upper plungers, the rising pl by levers, simultaneously with the descent of the u by plugs passing through holes in the table, so that the cavities is squeezed between the descending and and the blocks thus pressed are in each case then carri partial revolution of the table under another descen or propeller, which forces it out below, to be carried a less band. So far you see that, probably accidentally, alleged invention is an infringement of Mr. Hamel's ciple. Indeed, they are thus far identical but for the the multiple of 3, whereby Mr. Hamel's press, makes blocks at a time. Further, the simultaneous descent plungers and propellers, and the leverage of the rising accomplished by fixing the former, and the plugs w levers of the latter in the same frame above the ta means the clumsy expedient of weighted levers is also

Again, the process of carrying off the blocks by end not only provided for by Mr. Hamel, but, by an ingen vance they are (to prevent injury when forced out ne ceived by a hinged tablet, and tilted on to an incline which they descend to the bands, a precaution against tant to some kinds of fuel. You will observe that Mr tent is dated May 7, 1872, but it was invented earlier ment on a previous patent which he took out three may just add that before patenting this last invention the specification, with that of his previous patent, was the late eminent mechanical engineer, Prof. Rankine, with a request that if he, in his wide experience, knew better he would mention it, but if not that he would re nion as to the respective merits of the two submitted, knowing of nothing equal to either, he reported in fa rotating table with its appliances.

Mr. Lodge speaks of moving his table by a ratchet. Hamel's original plan, but he has improved on that by wheel with intermittent teeth, which moves the table intervals of rest, during which the plungers act. Mr also adopted the plan of working two presses at once action steam-cylinder and piston, with the necessary between the two presses, the piston-rod attached to toggles raising and depressing the plunger frames by its action.

Mr. Hamel's machinery has been adopted by the Patent and Artificial Fuel Company, and a brace of may now be seen in process of manufacture for the Fuel Works, by Messrs. Rotheroe and Bastin, King W London, at their foundry in Upper Ground-street, Black of them is finished and the other nearly completed, specimen of casting and ironwork cannot be conceive these presses contains nine moulding cavities, three three propellers. They work simultaneously, and are throw off six blocks of 10 lbs. weight each every working steadily. This invention is already exciting tion and admiration at home and abroad, and bids fair general use. The specification is silent as to the mode the moulds in Mr. Hamel's machine. It may therefore to observe that they are supplied by spouts or feeders from a hopper, which he calls a distributer, mounted of the machine. For the inodorous, smokeless Welsh to the manufacture of which two of Mr. Hamel's ma be applied at Briton Ferry, the material being moistened, the spouts or feeders are inclined or slanting scending from one of three openings in the distributer moulds as they successively arrive at their filling places.

The process is this—The coal on arrival at the factory from the truck at the proper place in its passage through a line of rails being carried through the building, in at one at the other, in connection with the main line, to which it From the moment the coal is shot down it is consigned nery, which mixes it with the agglomerating material the mixture, and delivers it into the distributers, which action of a circulating driver it is propelled in equal stre three openings in each distributer (having sliding doors the quantities required) into the descending feeders. W brought to the moulds the step-by-step rotation, before proceeds with its simultaneous triple action of filling, charging, and rolling away the blocks to be stacked. the time the coal-dust is shot down into the first recepta the rails to the time of its re-appearance in the shape of arrival at the stacking place ready for use, not a hand In four minutes from the time the coal-dust is consigned chinery the first two blocks appear, and thenceforth at

…each, as before stated, succed them every four seconds, …refore, 900 lbs. per minute.

CHARLES CLAYTON,
Secretary to the Metropolitan Patent and Artificial Fuel Company.

…-street, London, Feb. 12.

…machines above described are of massive strength and …designed for fuel that requires strong pressure, as …, being …in, or other offensive adhesive compounds commonly …, tar, …troleum, creosote, and other inflammable and disagree- …with …ts commonly used in the agglomeration of fuel, are …ingre…luded on account of their offensive odour in burning …fully …to spontaneous combustion when packed. The ma- …liability …ever, is adapted to the manufacture of almost all kinds …fuel, and …of bricks, &c., for which less strength and weight of …are …uired, the mode of feeding by upright shafts, or pug- …ing …mere matter of mechanical adaptation.

THE SAWDUST CHAMPION MINING POWDER.

SIR,—With reference to the new explosives which are now being …lied to various mines in lieu of black blasting powder there is …g fact which may be made prominent in your columns …interesting …ith regard to the above powder (Sawdust Champion) …, that …the quantity used in one blast the greater are the results …greater …metrically. In other words, a blast of 5 cwts. of black powder …ld give …ive times the result of a blast of 1 cwt. under similar …itions; …but a blast of 5 cwts. of sawdust champion powder would …considerably more than five times the result obtainable with …rt. It is …a peculiar feature in modern improvements that not …y are they …improvements in their primary applications, but when …lied for more advanced purposes they are immeasurably superior …the old things for which they have been substituted. Likewise …blasting on a large scale this powder will be found to be a greater …ress than ever. Calculating its present superiority in small …arging, what must be its superiority when used for maximum …arges?

E. J. W.

MR. ENNOR ON TIN DRESSING AND SMELTING—No. V.

SIR,—I next make my remarks on letter No. V., dated Jan. 11. …is chiefly for contaminated tin ores, such as are charged with …) from a quarter to half its weight with sulphur and arsenic and …r substances: all practicals know this is awkward stuff to deal …. I ask, should it be stamped fine or rough? I say, rough; for, …ough tin associates with sulphur and arsenic, it mineralises …n it but to a very small extent; the particles are generally …ll, and fall out quick; in that case it should be stamped very …h, and passed direct from the stamps through three or four …acting …iggers, one after the other: these will catch nearly all …tin with other ores, then the hutch portion would be down to …size it should be. I think most of the tin would be found in …hutches. Then dress and burn this hutch work in the usual way; …the rough ragging found in the sieve should be well burnt, and …exposed to the air for at least a week; then pass it through a …rubber, and, if required, re-burnt and dressed, when I think …a very small portion of tin would be found gone in the slimes. …men who study the laws of Nature have long since discovered …all ponderous substances are the easiest concentrated to the …ural law of gravitation before they are reduced to particles and …coming atoms; then from the before-mentioned jigger the waste …uld flow off to a round revolving griddle, where the slime would …through, and should pass to two well-made round buddles to …ow each. I have often seen the head of the second buddle very …d, it catches the second-class tin particles, which are imperfect; …this it should go to good frames (on these I will touch again); …rough from this griddle should go direct to a buddle, and to a …nd if required, as there is in this, as in all other substances, two …ses of ore; the second will not stop in the first buddle, but in …second, then it would be useless to throw all these heads back …one heap, it only makes extra labour, the second class will never …se to lay in the same bed with the first; there should be a divi- …n of all work, they should be dressed separately. I believe a …l of the now sent down the stream is from the second-class ore …the mines, but it is the first-class with the squatters below.

I may here reiterate my remarks on rough stamping this kind …are. …the quantity that can be got through with in the time …a far less expense, and I contend it will enable the mineowner to …over a far larger sum of money from the smelter; in fact, it may …summed up by saying far more tin will be caught by rough …ping than by fine, and at a great saving of expense. If my plan …adopted the mines will send off very little to the sea in atoms; …he squatters found what came to them was not fine enough, let …m stamp it lower if they like, it would then be those only who …uld make atoms. I notice two or three are out with remarks on …subjects. I think theirs appears rather a hasty discussion. It is …ecoming of any man to presume to contradict, or give his opinion, …ere he has heard what the man arguing has to say on any subject; …him conclude his subject first, no sensible man would do other- …e; practical men who understand all the subjects connected with …and the dressing would not presume to, until after the subject is …ished, as they must be, and are, well aware that it is quite enough …a man to write a series of letters gratis to the public for infor- …tion; to do so he has sufficient on hand, without answering any- …e who would rise up, as I have heard narrow-minded men do, in …midst of the argument, and say "That's a lie!" But I notice …fall in with my views generally in all but one point—that is …stamping; but that point is premature to them, they have been …ing the cart before the horse, let them hear me out, when I shall …quite prepared to meet all sound practical men, men who have …ad practice in contaminated tin mines, but I would not waste …e or any man upon any of these subjects if he really does not …ee by the light of a candle.

…conclusion to this letter, I have only to now reiterate that we …o two grand points at issue—first, shall we continue to put tin …from eight or ten mines into an iron-bound prison, and stamp …until it is reduced to fine particles of slime, and other minute par- …es, and let the *tin* be washed off to the amount of 100,000*l.* yearly—…0,000*l.* to feed squatters, and 40,000*l.* to go to the sea in minute …articles and atoms as hitherto; or shall we stamp larger, and use …eans to retain the majority of this *ore*? These are the real points to …ne at. Some visionary creature will, I have no doubt, rise up …xt week and say tin does not go off to this amount: that says no- …ing, but it is clear that the squatters fish out from 50,000*l.* to …0,000*l.* worth annually from the river, and the beach is paved with …articles of the best of tin, tin which they cannot catch; then how …uch more is out further in invisible particles, still as large as living …nimalcule; and how much is smaller still, and gone to sea? Do …ese impatient men know it is an easy matter to stamp tin or lead …e to such minute particles that none is to be caught? Here is a …ide field for them to employ themselves upon until I have opened …et the subject, when they can come out with something to their …redit, proving the quantity lost by well borne out experiments, and …grove, if they can, that these mines are not sending off 40,000*l.* worth …of tin annually in particles and atoms which is not caught by the …squatter, and then I will meet them, as my source of argument is …far from being exhausted.

I next …remark on smelting—letter No. I., dated Jan. 18. I may …well again call on them to notice my remarks on lead and tin …smelting, as a great deal lies in the smelters' hands as to preventing …tin from being stamped to slime, or small particles and atoms, and …not. I have asked them to aid the tin miner to stamp rougher, by …purchasing the tin at a lower produce. I will not go fully into this …subject here, as I did so fully in Nos. I. and II., I first want to hear …whether they are inclined to aid the mineowner by smelting the tin …ors in a rougher state, as they must certainly know that it is only …through fine stamping that tin is reduced to fine particles and …atoms, and sent to sea. This tin they never get to smelt, and many …of them must long since have been aware that portions of tin are …imprisoned in the present iron-bound prison for a week. I do not …expect they will attempt to tell me as to the portion that is reduced …too low to be caught by the very ingenious squatters. To me the …subject looks as though no one ever thought or noticed it, but I …must draw their serious attention to my experiments on lead, and particularly the Pentire Glaze case, which convinced me that far more than half went to sea. In my next I take up the slimes tin catching department.—36, *Hyde-street, New Cross, S.E.* N. ENNOR.

ON TIN DRESSING AND SMELTING.

SIR,—I am sorry to think your esteemed correspondent, Mr. Ennor, is so ungrateful. I thought, by trying to help him to deposit his tin slimes I might get a good word; but no, I don't think he knows how to sow seeds of kindness; if so, I am sorry for him.

With respect to the water going down the swallet, as he calls it, that is the only true part of his letter, and a good job it did, or I never should have got the lead. Now, there is no harm in plunging away at me, but why that sneer about *a* Mr. Johnson? To say the least, it was very unbecoming. You, Sir, know, and Mr. Ennor knows, that a more upright, generous, kind-hearted man never lived: let him fire away at the living, but do respect the dead. He also says, without a word of truth, that Capt. Harper and all hands were discharged. It was not so, the men were brought from underground to work on the surface. A more useful man than Mr. Harper on the works could not be. He not only kept the books and made out cost-sheets, but used to assay the samples of an evening to know if the slimes were up to the standard. He was still there when I was called upon to go to the Tamar Mines, so you will by this see there is not a word of truth in his letter.

Now, Sir, is it not a pity to see a man so gifted and blessed with great and varied talents pottering about in this way? It is neither honourable to himself nor just towards the *Mining Journal*. He should remember that it occupies a high position among the other scientific papers, and it is a pity that anything personal should be permitted. Depend upon it no man lives too long to do good, and I feel sure of this, that if Mr. Ennor would just set about sowing seeds of kindness instead of bitter ones he would be a great man. To enable him to learn that beautiful song, I enclose one for him; may he practise it with all earnestness, it will do him a world of good, and help him to do good to others. So, farewell to Mr. Ennor.

James-street, Old-street, Feb. 12. J. WALKER.

THE CENTRAL-LIFT STAMPS—CORNISH MINERS.

SIR,—In your Notices to Correspondents (page 146), a column exceedingly interesting to me, I find Mr. Walker making the following remarks:—"Really Cornishmen are but little to be trusted to do anything with machinery beyond their mere every-day work." This unmeaning attack (whose inspiration is drawn from the "American's Views of Cornish Men and Tin Mining," and so ably confuted by your correspondent, Mr. Knapp) is a very weak excuse for the non-fulfilment of the many promises held out for the Central-Lift Stamps, which is to effect an immense saving of power and coal, &c. Perhaps this apparatus may be sent even to more "outlandish" places than Cornwall, and have to be handled by less experienced workmen; and, if it is so difficult to set up, requiring so much time and extra skilled hands, would it not be preferable to send down true-born cockney Trades Union nine-hour workmen, with a working drawing, that the "Central-Lift" might be erected true, and every part adjusted, that it may go to work in good style, frightening the Cornish "natives," and giving the Gobbett a start that shall enhance the price of shares alarmingly. I think such statements are quite uncalled for. No doubt Mr. Walker is aware that there are plenty of workmen in Cornwall who are competent to fix, erect, and set to work any kind of machinery, even his stamps, although he has suffered defeat through not supplying proper working drawings and information to work from, or employing a competent foreman to look after the work. Perhaps the agent is to blame, or may be the secretary of the Gobbett, as no doubt Mr. Walker is under contract; then, some one is to see that the contract is not violated, by putting in a lime foundation instead of a concrete (?). If Cornishmen are not to be trusted, and are not competent, who is it that have manufactured, erected, and kept in going order such vast quantities of machinery as we find at Dolcoath, Tincroft, Carn Brea, Wheal Vor, &c.; and in what part of the world where mining is going on do we not find the Cornish as leading men? I have been in many mining countries, and mostly found the pitmen, agents, engineers, mechanics, and miners to be from Cornwall. If we are so very ignorant, so far removed from civilisation, so incompetent, &c., I think we can compare favourably with any other county. Our Royal Society, geological societies, Polytechnic, miners' associations, public library, reading-rooms, schools, and other institutions are in advance of many mining districts, and send out workmen who will compete with the pick of even the London Trades Unionists, or even the colliers, poor deluded victims of that great genius, Mr. Halliday, their leader.

Mr. Walker, no doubt, has an object in depreciating the ability of Cornishmen and their machinery, modes of working, &c., as the American had who lately visited Boscaswell, and gave us some tall talk in the Journal relative to the engines just imported working without fuel, and the poor, uneducated, unsheltered, uncared-for miner. If we turn to Sir Henry De la Beche, Sir R. Murchison, Robert Hunt, W. W. Smyth, and other such authorities we shall find a very different opinion formed of the Cornishmen than that of those gentlemen referred to above, therefore we may bear with the remarks of Messrs. Walker and Baker, and still go on progressing. There are many stamps, crushers, pulverisers, mullers, and grinders, forging ahead in Cornwall at present, and, no doubt, the old drudge stamps has had its day. Most of the patents are Cornish, but other patentees, not from the county, do not complain of unfair usage or bad foundations, but on the contrary speak highly of the assistance rendered, and numerous hints given them, to bring the patents to perfection. There is a vast fortune almost within the grasp of the patentee who brings out the best stamping machinery—that is, turns out the most work in a given time with the least fuel; but grumbling at Cornish workmen will not win the laurel, nor advance the race now going on among manufacturers of ore dressing and crushing machinery. I think if gentlemen would confine their remarks to the machines, and the actual work turned out by such patents, with truthful records of fuel consumed during a lengthened trial, it would be more beneficial to your readers, and lead us to a settlement of this vexed question, instead of endeavouring to slur or depreciate the character of a mass of toilers who have ever been the most peaceful, steady, and sober workmen this nation can boast of, and who to-day are an example worthy of imitation by the colliers, who are now being hounded into pauperism by trades delegates, and other impostors, who find stump oratory pays best, and more congenial to their idle nature. Such remarks complained of, and such influence as Mr. Walker brought to bear on the Cornishmen at Gobbett Mine, lead only to faction and discontent, and should be withdrawn; at least, this is the opinion of—

ONE CORNISH WORKING MAN.

TIN-DRESSING—THE RED RIVER.

SIR,—One of your correspondents, writing on this subject, asks us to regard him as the greatest authority in tin-dressing now living. Surely vanity must not only have led him to the verge of the precipice, but must have already precipitated him to the abyss beneath, seeing that he has had the assurance to write on a subject he must, in point of fact, be totally ignorant of. He essays to give an incentive where he has failed to propound one single particular, and endeavours to portray all other writings on the subject as completely futile. If we are to accept this worthy as the supreme judge of all our communications, then all that has hitherto been written on this subject goes for naught, and Mr. Ennor, Mr. Walker, and other practical gentlemen know nothing whatever concerning what they have been writing about.

Can anything be more ridiculous than the assertion that any propositions that have yet been published through the *Mining Journal* in reference to this subject are not of any practical value? The fact is he has been grappling with a subject with which he is entirely unacquainted, and, notwithstanding all his tall talking, finding himself in a dilemma from which he has little chance of escape, has consequently become desperate, and hits at random in all directions, in the vain hope of discovering a loophole through which by some contrivance he may effect an exit. Any man of ordinary intelligence understanding tin-dressing must be aware that the difference in the specific gravity of benoxide of tin and much of its associated veinstone is so small as to render their entire separation out of the question without resorting to a like mode of treatment as shown in my first letter on this subject. Y. T.

Glandora, Co. Cork, Feb. 11.

THE COURT OF STANNARIES—WHAT OUGHT TO BE DONE WITH IT?

SIR,—The case of the legal contest in the Harmony and Montague Tin and Copper Mine, so far as Mr. Spargo is personally concerned, has been discussed, and that gentleman may be well gratified with the sympathy expressed towards him from every quarter, and with the admiration shown for the courage and self-denial evinced by him in the long contest he has sustained, not only in his own interest, but in that of all other promoters and contributors to mining enterprise. But the question must be often put, and finally authoritatively answered—What is to be done with the Court, the absurd decision of which has been reversed by the clear and clearly expressed judgment of the Lords Justices of Appeal? It is to be hoped that the Legislature will ultimately answer the query by abolishing the Court, and placing mining property under the protection of the same laws which shield all other property.

This, however, will never be accomplished by the Houses of Parliament unless the people move who are concerned. Cornish men—at all events Cornish mining men—bear a great deal before they move; and they have borne so much from this Court of Stannaries that it is wonderful they have not long ago done so. They remind one of the poor horse in the knacker's stable, which he allows to be worried to death by dogs for the amusement of "gentlemen" who pay for the amusement. The quiet animal instinctively perceives the fate to which he is destined, shudders and submits, and is ultimately worried at the instance of those who expend their money on the ignoble amusement. A Stannaries victim is as much at the disposal of the wanton cruelty of those who can spend money enough to worry him in that Court, the instruments of which seem to proceed as if it were their instinct to send to death the unfortunate being exposed to their torturing processes. The Cornish and Devon mining interest should no longer remain passive under their sufferings, but act upon the advice of St. Paul to the early Christians—"Quit you like men, be strong."

In any effort for an organised agitation there must be two centres, London and Redruth; the former because it is the head, heart, and spring of all activities; and the latter because it is the local centre of the interests of the county of Cornwall. Committees should be formed, meetings held; lectures delivered, subscriptions raised, and reports of proceedings published locally, in the *Mining Journal*, and London *Times*. It is astonishing how soon the magnates of the English Peninsula and of its strangely-constituted law court will pay attention to complaints when they see the aggrieved acting together, exemplifying the expressive, although vulgar, or at all events common-place, expression, "A long pull, a strong pull, and a pull altogether." No great cause was ever won in England without organised means having been adopted for concentrating in the form of power, as well as developing and combining the opinions of those interested. At first any agitation against the Stannaries will be "pooh-poohed!" "It is as good as other courts;" "It is an old institution;" "It was granted in the interests of the Cornish miners when tin was the only staple of the county;" "It is now only opposed by those who are given to change." It would be well if the Court itself would reform of its own free will; but the only change ever noticeable in corrupt corporations like precedent bodies is from one state of corruption to another and a lower.

At first, then, it must be expected that the members for the county (including the boroughs) will, in a considerable number of cases, "turn a deaf ear" to the remonstrances. This is an expressive and common form of describing what politicians do who are interested in giving "the go-by" to the grievances of their constituents—they turn an ear to them as a matter of course, but it is "a deaf ear;" but let the attitude of the speakers indicate numbers, resources, and powers and the other ear, and every consideration, will be presented to them. As to the plea of old usage and antiquity of institution, it is like the Irish peasant who keeps at his door a sweltering dungheap because his own ancestors and those of his pig did so before him. It is no reason because this Court has done nothing to reform itself that it should be left alone, although its advocates, who are certainly not numerous, say, "Why should an agitation be raised against it, it is no worse than ever?" like the boy who said, "I never washed my face since I got it, and I'm sure I won't begin to wash it now." The business of those interested in Cornish mining is to circulate facts, which, whether they tell upon the apologists of things as they are in Cornwall and Devon or not, will fling light into every corner of power and authority, and induce just and potent men to come to the aid of the injured.

There are some important State documents which ought to be circulated, such as the reports of the two Royal Commissions recommending the abolition of those courts. Certain petitions presented to Parliament some years ago would be worth re-printing. The report of the Law Reform Society, showing why the Stannaries Court ought to be abolished, is worth re-printing *verbatim et literatim*. There ought also to be a collection of cases in in which hardships have been inflicted upon suitors, and unfolding all the eccentricities—none of which are excellencies—of this incongruous Court. A fair statement should be given in detail of companies wound-up in the Court when such were of a nature to exemplify its working.

The expenses in calls, costs, and as time now-a-days is more than ever money, the public ought to be apprised of the enormous expenditure involved in this way. But, above all, the oddities of procedure should be depicted faithfully and graphically. Probably there is not a man in England not a professional lawyer, or not connected with mines, who in the least suspects that there are courts where the prosecutor may be also judge, defendant, tax his own costs in any position he assumes, and tax everybody else's costs, even when he has appeared as their adversary.

The liabilities of shareholders on shares, &c., which they had disposed of, and accounts which they had settled years before with those concerned, as enforced by the *ipse dixit* of the Registrar, ought to be stated. All this should be done, and publicity ensured for it, and there can be no doubt that the cumbersome old Stannaries would be a relic of the past, and known to another generation at all events, probably to this, only by the memory of the mischief it created.

Old Broad-street, London, Feb. 12. AN OLD MINER.

THE TEIGN VALLEY, AND RAILWAY.

SIR,—Please allow me a small space in the *Mining Journal* to call attention to the general question asked at the present time by all parties we (who reside on the hills or banks of the Teign River) meet with, and by whom we are known:—"When is your Teign Valley line coming up with you?" "I should think they have had nearly enough of the South Devon affair, but I suppose they will go on until a score or two lives are lost, and then make a rush from the sea to your valley for security." We cannot answer the question, for we do not know when the line complete will be brought up with us, if ever!

At present I will, as briefly as possible, give an outline of our present position, and describe what has been done from the beginning, with a few descriptive remarks. Some few years since a railway was proposed by some enterprising parties who succeeded in obtaining an Act of Parliament accordingly. The line, therefore, was commenced, which, as I understand, was to intersect the Moreton Hampstead line at a point near "Jews' Bridge," and extend from thence up the valley to another point near the Teign Inn, a distance of about nine miles, which was to be the terminus; and this would be distant from Exeter only about six or seven miles. The line of way has been made almost complete throughout, but for some reason the works have been in abeyance for some years. This is regarded in the locality as a great misfortune, looking at the mineral wealth of the district generally, in conjunction with its agricultural demands. We will at first simply name the parishes through which the line passes, and their respective mineral-producing capabilities. Near the junction of this line with the Moreton Hampstead it shortly enters the parish of Hennock, through which it traverses at the outh eastern extremity some distance, thence on to Chudleigh, within half a mile to the town; Tresham, Ashton, and Doddiscombsleigh, skirting in its route the parish of Christow, and its present terminus being on the border of the parish of Bridford. Taking the parishes in regular order, then we first come to Hennock:

In the hills on the western slope of the river a series of micaceous iron and shining ore lodes, or veins, exist in the granitic formation, and manganese, lead ore, and also spathose iron in the clay-slate to the east, thousands of tons of these minerals having been raised and sold from Sir L. Palk's land. We next enter Chudleigh, as before indicated, which is famous for its production of lime in any quantity for agricultural and building purposes, and which, I have no doubt, is accompanied by deposits of hematite iron ore. Thence we go on to Trusham, in which there exists manganese, jasper, and possibly other minerals of great value; this hitherto has received by little, if any, attention. Next, Ashton, which was formerly celebrated for the supply of manganese, both in quality and quantity. Doddiscombesleigh comes last, but not least, in the supply of manganese, formerly produced by the energy and capital of the Messrs. Williams, of Cornwall, with splendid results. The latter three parishes are on the eastern banks, or slopes, of the River Teign, and on the western side are the parishes of Christow and Bridford.

The formation near the river is clay-slate, which is distant from its junction with the Dartmoor granite range about one mile only. The river flows from north to south, and the junction of the granite and clay-slate is about parallel with the direction of the river. About 30 or 40 years since a lead lode, or cross-course, was discovered in the clay-slate, having a direction of about north and south also, and rather extensively wrought on in a mine called Wheal Addems, in the parish of Christow; it was worked for many years, and produced large quantities of lead and blende ores. About 25 years since the Messrs. Williams obtained a mine sett immediately to the south of Wheal Addems from Lord Exmouth, which is now called, after his lordship, Wheal Exmouth. It has been worked to a depth of from 90 to 100 fms. from surface, and produced from 100,000*l.* to 200,000*l.* worth of silver-lead and blende ores. This mine is working at the present time, and making returns of ore. Adjoining the latter to the south is the Frank Mills Silver-Lead Mine, the southern boundary of which adjoins the parish of Hennock. This mine has been in active operation for the last 18 or 20 years, during which period it is said to have produced from 150,000*l.* to 200,000*l.* worth of silver lead ore, and for a considerable time paid good dividends, and will no doubt soon do so again. I am also informed a large quantity of good white or spathose iron ore exists, and may be raised from this mine at any time, but the present very heavy land carriage of 8*s.* or 7*s.* per ton to Newton Abbot, and 8*s.* or 10*s.* to Exeter, has hitherto prevented the proper development of this source of mineral wealth. Again, adjoining the latter mine to the south, is the South Exmouth Mine, in Sir L. Palk's land, which many years since produced many thousands pounds worth of silver-lead ore, but the deposit of lead was unbottomed, as miners term it, by a large deposit of good spathose iron ore, quantities of which are also said to exist. A company of gentlemen have now a steam-engine working on the property, keeping the water down, after having first drawn it out 65 fms. deep from surface, and it is said they are only waiting to erect the necessary driving machinery preparatory to raising the iron ore on an extensive scale.

The Teign Valley Mine, about four miles to the north, in the parish of Bridford, could supply almost any quantity of white sulphate of barytes, besides having a very promising silver-lead lode, from which a great many tons were raised and sold some years since. The hills back in the granite also produces micaceous or shining ore. It is generally considered an extension of the railway from the present terminus near the Teign Inn through to Exeter would meet all the requirements of the valley, and could not fail to pay well for its construction, thus forming an inland route to and from the West for passengers, &c., and enable enterprising parties to profitably develope its mineral wealth, comprising lead ore, blende, spathose iron ore, micaceous and shining ores, manganese, barytes, and, doubtless, other minerals, besides the conveyance of lime, all other kinds of manures, and the product of a large agricultural district. The carriage requirements of the mines even at present—ores, coals, timber, and sundry goods—amount to thousands of tons per year, and should operations on iron ore only be commenced on an extensive scale, in addition to what is now being done, the traffic would soon become important. The general impression is the completion of this line would transform a quiet (and may be retrogressive) valley into one of the utmost activity and progressive, requiring a much larger population and more cottage residences. There would be no lack of minerals, it is thought, provided markets can be found for them, and we hope, therefore, to see at an early day the line completed, and the valley converted into a hive of industry from one end to the other. NOVICE.

Bovey Tracey, Feb. 12.

MINING IN CORNWALL—No. III.

SIR,—I was much pleased in my rambles to find that they had vigorously commenced operations at *Bosworgey*. From seeing reports from time to time in the *Mining Journal*, I was at a loss to know the exact spot where this mine was situated. The company have made a good selection as far as the topographical and geological situation goes. On the west is the old Wheal Lewis, which was noted for its productiveness at the last time of working, and on the east by Carzise, which has been well known to many of your readers as a rich tin mine. For years past they have been working at Bosworgey at the back of the adit level, and I may venture to say that thousands of pounds worth of tin has been raised by tributors, and sold to bargain buyers. If my memory serves me rightly I was told that 300*l.* worth of tin is being raised monthly. I saw, however, some good piles of tinstuff hauled to surface, which appear to have been got from a strong lode. The engine will be soon at work, and the shareholders receiving their reward, in good dividends, for their enterprising spirit.

I said that on the east of this mine is *Carzise*. This property is also being re worked, but not with that spirit and energy which the character of the mine deserves. It is nearly 30 years ago since it was last abandoned, not so much on account of its poverty as the bad management. Everything was allowed to go into wreck and ruin, which made profits a question of impossibility. I have been told by miners who worked there for years, and whose opinion is unquestionable, that there are thousands of fathoms of high ground in the eastern part of the mine that would do well to work on tributes from 7*s.* to 12*s.* in 1*l.* I would advise the shareholders to push on with all possible speed, and success is almost certain.

Going on towards Great Wheal Vor I found another new engine (rotary motion) erected at the north of Carleen old mine. I would not venture an opinion on this, as I do not sufficiently know it, being an entirely new concern. It is my impression, however, being a side lode to the Wheal Vor and Carleen lode, there will be a chance of finding it productive in the western part of the property, where the lode failed in Carleen.

The *Great Wheal Vor Mines* have considerably fallen off in their returns, but seeing the large amount of ground which is yet standing to the westward, containing I may say almost every indication of productiveness, there is everything to hope for, and but little to fear.

Great Wheal Fortune.—Here I believe the operations are chiefly confined to surface. They are working in an open cut, the whole of the stuff producing about , lbs. of tin to the ton. This I should say would give a good profit, as they can send it into the stamps for about 6*d.* per ton.

I thought that greater energy would have been put forth at *North Metal*, seeing the prospects they have before them. The formation is the same as the Great Wheal Vor, having the same lodes running through the entire property. The property should be energetically worked, and at the present price of tin it would soon, I believe, be in the Dividend List.

The *Pneumatic Stamps* seem to be getting in favour with men who aim at advancement in the process of tin dressing. I had not the opportunity of seeing them at work, but I was told by some of the most experienced agents that they do their work admirably, and at much less expense than the old stamps. One very important characteristic in the pneumatic is it does not so easily get out of repair, and another the friction is reduced to a minimum, thereby doing a greater amount of work with much less fuel, which is a great consideration in these times. Great praise is certainly due to Mr. Husband, of the firm of Messrs. Harvey and Co., for his skill and perseverance in bringing this machine into such a state of perfection. I wish him every success, and that the county will realise the sense of gratitude which they undoubtedly owe to him. JNO. ROBERTS.

Constantine-terrace, Carnarvon.

WEST MARIA AND FORTESCUE.

SIR,—The statement in last week's Journal as to the suit instituted by the Messrs. Willesford against the company is so erroneous, and written with so apparent an animus to injure the company that I feel it my duty to apply to you for the name of the writer of it.

That "this suit exhibits another striking illustration of the law's delay" is very true when worked, as the plaintiffs have endeavoured to their cost, to work the law in this case.

It was not "*On* the filing of the bill by the proprietors of West Maria the company made an application to have the question decided by arbitration, there being the usual arbitration clause in the lease for the settlement of disputes." It was *before* the filing of the bill, and the plaintiffs not only refused arbitration but applied for an injunction to stop the working of the mine, and declared they would shut it up in a month. In this application they failed—to their cost. No question was left to a Master in Chancery, but the Vice-Chancellor Stuart, before whom the suit was filed, decided at Chambers that the arbitration clause was sufficient, which, after a hearing for the second time in court, Vice-Chancellor Wickens confirmed, and that Messrs. Willesford ought to have so proceeded. Against this they appealed, and have now been beaten for the third time in the full court before the Lord Chancellor and the two Lords Justices, even without hearing the company's counsel. The whole of your correspondent's statements about the Master and his decision are inventions, and seem made for the purpose of injuring the shareholders and whitewashing the landowners at their expense. You have thus been imposed on, and, I doubt not, will, by your publication of this letter, be glad to put your Journal right.—*Renfield street, Glasgow, Feb.* 13. JOHN E. WATSON, Purser.

THE GEM TIN MINING COMPANY.

SIR,—I was surprised to see, in the Journal of Saturday last, a report, signed by "A. Granville, M.A.," on this mine. I wish all interested in this property to know that the captain states Mr. Granville has not visited the mine for a long time, nor has he been underground since this company took possession, in March, 1872; I need, therefore, make no comments on Mr. Granville's "Special Report," or the statements there contained. Mr. Granville several times applied for the appointment of director, but the directors declined his services.

Buckler's bury, London, Feb. 12. FRED. WARWICK, Secretary.

WHEAL WHISPER TIN AND COPPER MINING COMPANY.

SIR,—The letter of the Secretary of the Wheal Whisper Tin and Copper Mining Company is not a bad specimen of special pleading; but I fail to see that it meets the objections which I raised to the directors' mode of getting up a balance-sheet. In dealing with my objection to a merely speculative valuation of the company's property, Mr. Larchin contents himself with citing exceptional precedents. He, moreover, announces an enlargement of the assets, which for consistency's sake should really have figured in the balance-sheet. I must still adhere to my advocacy of greater simplicity in showing the profit and loss on a year's business. On the one side I should show stock on hand at previous stocktaking, with expenditure and accrued liabilities; on the other, the proceeds of sales and convertible stock remaining on hand. Expenditure for permanent improvement may often be legitimately paid out of capital, but can hardly be converted into an imaginary profit. I do not aspire to "bearing" the shares, else I should not advocate the utmost simplicity in getting up the financial statement. With combined activity and care in the management of Wheal Whisper I anticipate handsome dividends. When we hear of less water and more tin it is hoped there will be something better than grumbling letters in— A SHAREHOLDER'S POCKET.

EAST TERRAS MINING COMPANY.

SIR,—I note the remark of "Shareholder" in the Supplement to last week's Journal, and think with him respecting the liability of the directors in not calling a general meeting in accordance with the Articles of Association. Under present circumstances the shareholders, as a body, are better to make enquiries of the secretary, 1 and 2, Great Winchester-street buildings, who I learn, as "Shareholder" states, is not able to bring about the meeting. I have several times asked the manager for information respecting the company, but can get no reply.

Truro, Feb. 12. A VICTIM IN SEVERAL CONCERNS.

THE STANNARIES COURT.

SIR,—In last week's Journal "Justice" considers the public are wronging the Stannaries Court, because it has been the means of doing much good to the merchant and miner. Well, if any person will take the trouble of going into the Stannaries Court store room, at Truro, they will see new iron safes of all sizes, new mahogany office fixtures of the latest fashions, new ledgers without an entry, and innumerable other articles. Enquire what these are here for: you are told they are the properties of mines just started, and "knocked." The articles have been removed for the purpose of sale; of course, the merchant gets his bill paid, however large, and the miner his wages, whatever time he chooses to put in; at least, that was so in my case, and the unfortunate wealthy shareowner, living at a distance, has to pay the money on demand, or find a bailiff quietly seated in his house some evening on returning from business, and the unhappy man under the impression that his ruinous mining speculation had been settled years before. There is no doubt the Stannaries Court has become the dread of persons with money, who would otherwise invest in Cornish mines, therefore it is time the whole Court was swept away, then Cornwall might again be prosperous and healthy, for a more wealthy property than Cornwall presents cannot be. A STANNARIES COURT VICTIM.

NEW QUEBRADA COMPANY.

TO THE EDITOR OF THE MONEY MARKET REVIEW.

SIR,—I must beg for the third, and I hope the last, time to trespass on your space while I reply to another of those anonymous slanderers and detractors who do not dare to put their names to their vile attacks on this unfortunate company. I allude to the letter in your paper of the 1st. instant, signed "Civil Engineer."

Your paper is so widely read by my fellow-shareholders that I have letters from several, who also refer to an anonymous advertisement in the *Daily News*, the *Mining Journal*, and other papers, under the signature of "Warning," to the same effect, all enquiring whether there is really any difficulty in making a railway, or any as to its being made, to which I unhesitately reply, through you, "Not an atom of either one or the other."

"Civil Engineer" does not even pretend to be a shareholder; why then should he meddle in our affairs, in which he has no interest, and of which he is evidently ignorant? He speaks of his "personal knowledge of the country" (which I very much doubt), but does not pretend to know anything of our particular part of it. There are places in Venezuela, as in all other countries, where it would be impossible to make a railway to pay, but that is not the case where we want one, as perhaps it would be difficult to select any 60 miles of line in South America comprising so many facilities for rapid and inexpensive construction—a gentle decline from the neighbourhood of the mines to the sea, no deep cuttings, no heavy embankments, no large bridges, no swamps, plenty of timber on the spot, plenty of ballast within reach, and I can promise the contractors, with a month's notice, an abundance of unskilled labour at a reasonable rate. What would he have?

Does the "Civil Engineer" without a name, who never saw the place, intend to put himself in competition with Mr. Hawkshaw, who has a world-wide one, and who resided at the mines for two or three years? That gentleman, whose well-known character is the best guarantee for the value of any opinion he may express, wrote a very interesting work on Venezuela, in which, after speaking of the inexhaustible quantity and very valuable quality of the ore in our mines, he says (I write from memory) that "the only things required fully to develope them was a railway to the sea." He had the whole line surveyed with that view, and found no engineering difficulty in the way, when failing health compelled him to leave the country, and the company he represented, having, like ours, exhausted all their capital, the works were temporarily suspended. I am informed that the directors of the Bolivar Railway Company have recently consulted Mr. Hawkshaw, and have perfectly satisfied themselves of the perfect feasibility of a railroad.

Again, does this unknowing and unknown "Civil Engineer" put himself in competition with Messrs. Waring, the celebrated contractors, who, when negociations were going on with them two years ago, told the Birmingham shareholders in my presence that they had taken the best practical means of satisfying themselves that there were no difficulties in the way of making the proposed railway. Why, then, are timid shareholders to be constantly frightened into sacrificing their property, and selling their shares at one-fourth of their real value, by the reckless assertion of a "Civil Engineer" or "Warning?" whom I believe to be the same person, but not a shareholder; nor is the name of "H. Fortescue" used in the advertisement, on our register at all!

One of these worthies tells us we shall have to pay 4*l.* 5*s.* a ton to carry 20,000 a-year, and the other that we shall have to pay 85,000*l.*, which is the same thing. It is no doubt a very high price, but the shareholders having determined (I have always thought, and still think, very judiciously) to have a railway, they must pay for it either in principal or in interest. They will not raise the capital themselves, and therefore must not grumble if they have to pay others dearly for doing so.

The question is—Is it worth our while to pay that price for it? These *quidnuncs* say, No! I say, Yes! and will tell them why. Many a successful company cannot better afford to pay 4*s.* 6*d.* a ton for carriage than we can 4*l.* 5*s.* from the great extra percentage of copper in our ore—over almost all others. Mr. Hawkshaw, in his book above referred to, gives a description of the various ores, and sums up by stating that there is an average of 30 per cent. of pure copper in the whole. Mr. M. C. Vincent, whose extreme caution is proverbial, was more recently for some weeks at the mines solely for the purpose of assaying various samples, for which he had every means, and he put it at a very little less. This gentleman has acquired an enviable reputation, as in almost every case the results have favourably exceeded the estimates in his reports. He told me recently that a specimen from the adjoining Titvara Mine, which also belongs to this company, but has not yet been worked, was assayed by him on the spot, and produced 75 per cent. of pure copper.

From these and other estimates I could produce we shall be quite safe in calculating that, even on paying 4*l.* 5*s.* a ton for carriage, there will be a net profit of 10*l.* per ton, at least, after leaving a wide margin for a fall in present prices. This on the minimum of 20,000 tons will produce 200,000*l.* a year, but if proper means are taken to develope the several mines there is nothing to prevent us in two or three years producing 30,000, 40,000, or 50,000 tons of ore a-year.

"Civil Engineer" tries to frighten us with the idea of the Bolivar Railway Company seizing our property. Such a thing is possible, but it could only arise from execrable mismanagement of our company, which we must take care and prevent. He says we shall have to pay the enormous sum of 85,000*l.* a-year "in perpetuity," which only proves his ignorance, as by the agreement between the two companies, which I have seen, our company has the option, at the end of ten years, to purchase the railway by giving a profit on its prime cost. He says again that we must raise 40,000*l.* to 50,000*l.*, which is true; but it is not true, as he says, that we must pay 100,000*l.* for it. Only let the railway be once started and I will show him how we can raise all the money we require without difficulty and without sacrifice. "Warning" very wisely proposes to issue 20,000 new shares, at 4*l.* 10*s.* a share, the present price. Is he so silly as not to see that any such attempt under existing circumstances would knock them down to one-half, or one fourth, or possibly to the 10*s.* he speaks of. It is to be hoped he is a better "engineer" than he is a "financier," or he will never live by his profession.

If our directors will only rectify the illegalities into which they have fallen, from the want of care or of good advice, in which I and my friends will give them every assistance in our power, as long as they go properly about it; if, by being better advised they will avoid such illegalities for the future; if they will cease to defend actions which are indefensible; if, in short, they will turn over a new leaf and make the management what it ought to be, I am convinced that there are still very bright prospects for this company which it need not take long to realise.

Before concluding, allow me again to question the prudence or the justice of your admitting letters calculated so greatly to damage the property of others, without giving the names of the writers, to show whether they are "rowing in the same boat." And, in conclusion, I would advise "Civil Engineer," "Warning," or Tom Smith, or any other name they may choose to write under, not to meddle in business in which they are not interested, and do not understand, for I am satisfied that every *bona fide* shareholder will say that if ever this company is to be got out of its present difficulties, it will be "*Non tali auxilio, nec defensoribus istis.*"

Moorgate-street, Feb. 13. FREDERICK H. HEMMING,
Consul for Venezuela, and holder of above 500 shares.

[For remainder of Original Correspondence see to-day's Journal.]

GREAT LAXEY MINES—NEW WASHING MACHINERY.—Looking out of the window of our vehicle as we were passing down the hill into Laxey we observed what appeared to be long broad patches of some dark substance extending in all directions amongst the shingle on the beach, and on going on to the shore we found that the entire beach for about 400 paces was literally covered in many places to the depth of 10 or 12 inches, with what a number of old miners, whom we accidently met on the spot, assured us was "very good black jack," well worth, as one said, "from 4*l.* to 5*l.* a ton." There may have been plenty more of it beyond the spot to which we went, but the tide was too far up to enable us to pass any further that way. This black jack had been carried down the river from the new machinery at the washing floors, and on its arriving at the sea it had been carried on to the beach, and spread there as a somewhat startling tertimony to the system of management which, without the most careful enquiry, authorised the smashing up and removal of old machinery which had done its work well for years, and in its place erected an expensive apparatus which seems utterly incapable for doing all the work for which it is intended, and which, judging by the appearance of Laxey beach on the occasion of our visit, does its duty so badly that hundreds of pounds of valuable mineral are wasted by it. Indeed, so large is the quantity of blende on the beach that one of the miners, with a touch of grim humour which was intensely amusing to us, but must be anything but pleasant to the shareholders, suggested the formation of another company to save the blende washed away and wasted by the "economical" and "labour-saving" new machinery at Great Laxey.—*Isle of Man Times.*

RAISING AND TREATING ORES AND METALS.—The novelty in the invention of Mr. JOHN WALKER, of James-street, St. Lukes, consists—Firstly, in the mode of employing the drums for raising ore from the mine, by means of a sliding iron frame, and thus allowing the driving shaft to rotate constantly in one direction; secondly, in lifting the vertical shafts or stampers on both sides of their caps by revolving arms acting simultaneously thereon; thirdly, in forming the stamping bed with recesses having holes therein, covered by a strong grating for dry stamping, and in substituting therefor a moveable solid plate, and in casting grooves in the insides of the bed, and back and front plates, for receiving grates for wet stamping; fourthly, in providing curved troughs for holding water to lubricate the lifters as they rotate; fifthly, in providing a rotating toothed or bladed drum for turning the slimes out of one trough into another; and sixthly, the mode of turning the stampers round by means of an iron collar, with projecting handles fastened to the upright shafts by a set screw.

Royal School of Mines, Jermyn St.

GEOLOGY—LECTURE II.

A Course of Lectures on "Lakes, their Origin, and Geographical Distribution" is being delivered on Monday evenings at the Museum by Prof. RAMSAY, F.R.S., Director-General of the Geological Survey of the United Kingdom.

"Saltwater Lakes, their Origin, and Geographical Distribution" formed the subject of Prof. Ramsay's second lecture. He recapitulated the main points of his previous lecture, in which he had endeavoured to account for the formation of the many freshwater lakes by the grinding-power of ice; but that they have been produced by denudation and waste, exhausted all the other processes of denudation which to account for the basins, no other agent known to us was left to rice. One of his audience had written to him to ask if the falls in the earth's crust might not have produced rock basins; but he reminded them that he had stated in his previous lecture that, as had been so much waste since the time of the fault that often now at the surface, and in some cases the change has been so great that time on the tops of the mountains is now at the bottom of the valley ceeded to the special subject, and said:—In this lecture I wish to of the phenomena connected with salt lakes, and especially to to be salt. I cannot always account for salt lake basins, but for clear data. All who know anything of the elements of geology a great scale rocks may be divided into two great classes—igneous The aqueous rocks have been produced by the power of water, heat—that is to say, as far as we know, by the internal heat of canic rocks are igneous rocks—the lavas poured out of the crater up by the explosive force of steam blown hither and thither by certain cases falling to the ground, and being regularly stratified these igneous rocks, including granite, were formed deep beneath the earth. But the common stratified rocks, classed into formages, and enclosing in most cases remains of living things, form portion of the rocks at the surface in most countries, and I have saying that in Britain not one tenth part of the rocks we see are igneous. All these rocks contain different kinds of minerals—e specimen of granite, the large crystals are formed of felspar, the mica, and the basis in which these crystals are embedded is quartz. The substances most frequently met with in the rocks silica, potash, soda, peroxide of iron, &c. If we turn to the we find that it consists of—Nitrogen, 77·5; oxygen, 21·0; and carbonic acid, 0·08. The latter constituent is always present as water has the property of absorbing a certain proportion more or less carbonic acid, and carries it with it as it sinks into carbonic acid in water has the power of dissolving out certain rocks—viz., lime, and carrying it away in the form of a bi-carbonate ing upon rocks containing felspar, or decomposed felspar, the rain larly dissolve the potash, soda, or lime, as the case may be, and in solution. And so we find that the water of all springs is more with impurities, which have been obtained in this manner from example, the water of the fountains in Trafalgar square contains 25·7 grs. of common salt, 14·5 grs. bi carbonate of soda, 18·4 grs. and a great number of other minor substances—making in all 87 of various salts in solution. Take, again, the Thames water at dington, on an average, there passes throughout the year 8332 cubic second, and each gallon contains 22·5 grs. of salts in solution, of lime—and this gives in the course of one year as much as 27 carried by the Thames into the sea. The old well at Bath yields water every minute—making 181,440 gallons per day. In every gallon are dissolved 9 grs. of carbonate of lime, 17 grs. sulphate of soda, ride of magnesium, and many other substances—making altogether salts per gallon. This gives 3732 lbs. per day, or 608 tons per year. pose that quantity precipitated by evaporation, and compressed into a cubic yard of limestone, you would get a square column built on in diameter, and 912 ft. high, and this is carried away every year their way into the rivers, and by them into the sea.

Take the water of such a sea as the Mediterranean, and the proportion of lime (0·113) in it is so small as to be barely appreciable by so large that all the creatures living in the sea form their skeletons afterwards go to form strata of limestone. These limestones formed on a large scale in past periods of the earth's history, and every age except those formed inland by evaporation, have been lakes, in estuaries, or in the open sea by the processes above described of the most wonderful chapters in the earth's history; the change cle—you cannot tell when they began, neither can you tell when

Salt lakes are not nearly so numerous as freshwater lakes, but of the world there are, nevertheless, a very considerable number example, in the north of Asia. The Caspian Sea has an area about as large as Spain; east of that lies the south of Aral, and the Pacific in the mountainous parts of Asia, north of the Himalayas, the great table land of Thibet, and the high land east of this, of lakes, all of them, with one or two exceptions, are salt, the being Lake Baikal. In Syria, the Dead Sea is one of the most in the world, and that is a salt lake. And in North America, the freshwater lake district, among the high mountains and great plains, lies the great salt lake of Utah, together with a number which are salt. In South America, among the mountain ranges a considerable proportion of salt lakes, and in the interior of Australia of salt lakes, some of which are only filled with water during the whilst others hold water all the year round.

If now we look at the physical character of the region in which and its neighbouring lakes lie, we shall find that all the lakes of the area of inland drainage—i.e., very nearly all the rivers of that region selves into these lakes. And these lakes have no outflow, and are which have rivers running into them, but no outflow, that are salt. Such is the case with the Dead Sea, and the salt lakes of North Australia. In the great desert of the Sahara are numerous springs of water fresh, but in the main brackish, and sometimes exceedingly salt. It may be regarded in a certain sense as an area of inland drainage. With the Mediterranean Sea, the district round the Caspean and in Asia, may be looked upon as one great area of inland drainage. The results of the analyses of the waters of several of these seas are as that the Mediterranean Sea has a percentage of 2·946 of common very nearly the same composition as the Atlantic or Pacific Ocean, saltier, the reason being that the great surface of it, which is exposed of the sun's rays, is subject to a constant evaporation, by which not only is evaporated, and the salts remain behind in solution. The water away is made up partly by the rivers which flow into it from the but also to a great extent by water flowing from the Atlantic through Gibraltar; and owing to the evaporation there is a tendency for the in the water to become more or less concentrated. A current of water the Mediterranean to the Black Sea beneath the surface, and an Sea to the Mediterranean at the surface, the latter being in excess proved by the fact that while the total percentage of salts in the 3·77; in the Black Sea it is only 1·7691 (of which common salt stands Black Sea has a large number of rivers running into it, which are ing it, and given sufficient time it will become fresher and fresher result of this freshening is shown in the forms of the shells that live in that water, for E. Forbes showed that many of the shells are of what he called "monstrous" forms, though of the same genera in the Mediterranean; and it is well known that creatures living in so to speak, unhealthy to them in course of time assume forms unlike The value of these observations on the subject of the lectures will forcibly as we go on. Next in order comes the Sea of Azov, which ning into it on a great scale also, and its waters are still fresher, salts being only 1·188 (and of common salt only 0·9658). The Caspian less percentage—0·6294 (of which common salt makes up 0·3572). creatures inhabiting it we know that it must have been at some nected with the ocean, and for a similar reason it is inferred that communication with the North Sea. It waters are considerably of the great oceans, few shells occur in it, and porpoises are found proof of its former connection with the ocean from which it has changes in the physical geography. Why is it fresher? By an present shells occurring in it and of those found fossil in recent margin, it appears that it was formerly much larger than at was connected with the Black Sea. And it appears to me that it was much salter than at present, but that it became considerably influx of great rivers, and now when it is again cut off from the gradually salter by the accumulation of the salts carried into it left behind on the evaporation of the water. Its level at present that of the Black Sea. Coming next to the Dead Sea, we find 1300 feet below that of the Mediterranean, and the bottom has face: in length it is about 40 miles, in breadth about 9 miles. great depth below the surface the salts are more concentrated giving a total percentage of 21·056 (including common salt 12· magnesium, 7·822; chloride of calcium, 2·455; chloride of potash

The River Jordan runs down the valley through the Lake of Tiberias Sea. How does the Dead Sea get rid of its water? Solely by evaporation have shown you that all waters running into lakes, or elsewhere solution, the result of evaporation must be that in course of time water will get concentrated, and will go on increasing till the salts and then precipitation will take place. What was the original cause sion which formed this lake I am not prepared to say. I have explain the formation of alt lake basins by glacier action, and I man to attribute the Dead Sea basin to that cause; depression very well have formed great basins like the Caspian. However, waters of the Jordan flowing into the depression, and there being Dead Sea is the result. It has been said that crystals of salt have from it sometimes, and when its margins have been laid bare in they are found covered with thick coats of white salt, deposited the evaporation of the shallow water which covered those parts. runs into Lake Tiberias, and also flows out of it again, and this There is no reason why the Dead Sea should be salt but the one

We now come to another point of the subject. Over India the blow from W. to S., and deposit the greater part of their moisture before they have passed the great range of the Himalayas, so that north side of that range is a comparatively nameless region. The not fall in sufficient quantity to make the rivers overflow their fore, though they have rivers running into them they have no consequence salt. The only great exception is that of Lake Baikal, running out of it to the ocean, and that is fresh. Turning next we find the prevalent wind blows from S.W. to N.E., and as a quantity of vapour raised from the Pacific carried along with the Sierra Nevada a great precipitation of snow takes place, mountains you find great snow fields and glaciers. The moisture is precipitated before the wind comes into those

ose parts are comparatively rainless, and the lakes have no out-
by weight of the water of the great Salt Lake occur 20·196 grs.
um (common salt); 1·834 grains sulphate of soda; 0·252 grains
ia; a trace of chloride of lime: in all, 22·282 grains of salts in
about this lake are undulated grounds and great plains, and it so
plains are covered with a crust or efflorescence of bicarbonate
times other salts. How does this occur? The rain sinks into the
heavily at certain seasons, and saturates them more or less; then
ason is over, and the heat becomes exceedingly intense, and the
ly hot, the water that more or less saturates these rocks rises to
as dissolved certain constituents out of the rock material, and
evaporated these salts remain behind, forming a crust on the
ntry. It is for this reason that a larger part of the rivers which
lakes are more or less brackish, and some very salt. There is
the salts in the Great Salt Lake must be getting very much con-
elieved to be nowhere of very great depth, and on examination
und about the lake a number of horizontal lines may be seen, some
present surface of the lake, which lines mark the former levels
y the configuration of the country we see it could then have had
erefore, the concentration of the salts must have been going on
far removed that we know nothing of it except that it was very
of this we may be certain that if the physical geography of the
mains in time to come as it is now, a period must come when,
influx of salts into the lake, precipitation will take place, and
very lake which is subject to the same kind of influence as the

ON THE SCOTCH MALLEABLE IRON TRADE.

ANS, formerly of Glasgow, read the following paper on the above
subject before the Cleveland Institute of Engineers, on Feb. 14.]

own of the finished iron trade of Scotland previous to
and 1784, when Mr. Cort, of Gosport, obtained his
puddling and rolling of iron. There is nothing to
e twin inventions operated as a stimulus upon the
number of iron manufacturers in Scotland until many
were known and practised elsewhere. In those days
of new discoveries was slowly felt, and as the statis-
of the last century are both scanty and unreliable, it is
difficult to obtain data to suit our preliminary purpose—that,
cing the earlier development of what is now a colossal
, of taking
ighly profitable industry. It will be understood that the follow-
marks, unless where otherwise specified, refer to Scotland alone.
RIGINAL.—After much research I have concluded, on evidence
rather than positive in its character, that the manufacture of malleable
first commenced at Carron. From the establishment of these works in
1760 the total quantity of iron of all kinds made in Scotland did not ex-
per annum. Sir J. Sinclair's statistical account, dated 1792, thus
Carron Works:—"These works consist of five blast-furnaces, a clay
clay and making fire-brick for the use of the said furnaces, an
4½ tons of water at one stroke, and on an average draws seven
te. The engine goes in time of drought, and consumes 16 tons of
Besides the air-furnaces there are three cupola furnaces that go
last-furnaces, by pipes conveyed from the machinery of the blasts;
much the same with the air-furnaces. There are also four boring
guns, pipes, cylinders, &c. They have likewise smiths' forges for
anchors and anvils, as well as small works of various kinds, be-
making malleable iron, and a plating forge, also a forge for stamping
of which, with the helve, are both of cast metal, and weigh 1½
masters of Cleveland may indulge a smile at the quaintness of this
the primitive character of the appliances described, but at that
Works were regarded far and near as the eighth wonder of the
looked with fear and trembling on an establishment, the pon-
suggested to their lively imaginations the idea of Vulcan and the
in making thunder bolts.
e of our iron was next undertaken at the Clyde Ironworks. Sir
dair, writing in 1791, thus refers to the event:—"The iron used at the
comes chiefly from Russia and Sweden, upwards of 1000 tons
ported from the Baltic yearly. The average cost per ton (including cus-
, and freights from 8s. to 15s.) is 17l. for Russian and 18l. 10s. for Swedish
ne kind of the latter, the produce of the famous mines of Dan-
Cregrand iron, from the port whence it is shipped, comes to 24l.
is used solely for making steel. The different kinds of iron are
than they were in 1780—(or within 11 years)—which rapid ac-
induced the proprietors to erect furnaces at Clyde, near Glasgow,
making bar iron for Cramond, which they hope will in a few years
h sufficient materials, and save the great sums remitted for the

the mode of manufacture in Scotland, as indeed throughout the
was crude, wasteful, and expensive in the highest degree. The
melted in a refinery with charcoal, until they became what was
m, which, when it solidified, was again placed in a furnace, and
ther course of treatment. When the iron was sufficiently malle-
lumps, after being operated on by an iron bar, it was placed be-
ng hammer and formed into cakes an inch to two inches thick,
ne, these cakes were transferred to the balling furnace, where
el to a fusing heat. When the mass had acquired a pasty state,
as taken out and drawn into a short bar under the hammer.
inished, was applied to another of the piles, to which it adhered,
was again applied to weld the two pieces together. The same
inued *ad libitum*, until the whole bar had attained the required
was removed to the slitting mill, and after lamination cut up into
various sizes. It is calculated that in these different processes
e of iron amounting to at least 10 per cent. for every ton of bars
ot until Mr. Cort patented his process that pig-iron could be con-
able iron in a common air furnace by the flame of pit coal; and
ho first used rollers instead of hammers in manufacturing bars.
Johnston, Liverpool, himself an iron merchant, read a paper before
olytechnic Society "On the State and Prospects of Our Iron Trade
Wales," in May, 1839. In this interesting document it is stated
largest makers of iron in Scotland are directing their attention
re of bar iron, and with every prospect of complete success. The
Company are erecting mills and forges capable of making 230 tons
per week. Dunlop, Wilson, and Co., of Dundyvan, are making
nable them, when in full operation, to produce 300 tons of bars
n Dixon, of Govan Ironworks, has now ready for immediate work-
or producing 200 tons of malleable iron per week. The Muirkirk
ave four blast furnaces, three of which are in blast, with an ave-
about 40 tons of bars weekly, and the capability of extending to
increase of power. This statement comprises the present, and so
he prospective, operations in the malleable iron trade of Scotland,
n of two small forges, the Lancefield and the Gartness, where they
om white iron."
than 45 years since the puddling process was first permanently in-
otland. The habits and predilections of the ironworkers were dif-
e, and although they were instructed in the *modus operandi* by a
men from England and Wales, brought over specially for that pur-
ot take to it kindly. Like every other invention, instinct with
progressive influences, the puddling process ultimately triumphed
cient and cumbrous mode of manufacture, and once its merits
guised it gave a great impetus to the malleable iron trade. This
the year 1838, from which the actual rise of the trade may be dated.
ent on to notice the order in which the different works now in ope-
together with their capacity of production. He continued—
ery difficult but practically impossible to furnish a correct state-
leable ironworks of Scotland at the present time. Mr. Hunt, in
atistics for 1871," sets the number of works down at 14, with 339
s and 41 rolling mills. But although the most recent available,
not apply to the present time, the last 18 months having witnessed
the direction of extending the production of nearly all the prin-
introducing new forms of the puddling furnace. To the latter
t the remainder of this article will be devoted. My lack of prac-
with the iron trade will at least enable me to speak dispassionately
and communicate the data I have been enabled to collect "without
affection."
UDDLING-FURNACES.—Within recent years Cleveland
dly taken the lead in devising ways and means of re-
ste that is universally admitted to take place unneces-
ordinary puddling-furnace, and the adoption of Danks'
ne is not unreasonably regarded as the climax of our
this direction. But the ironmasters of Scotland, with
to economy so characteristic of their country, have also
share to render the selection of the best puddling furnace in the
erplexing and difficult task. Gorman, Howatson, Ellis, Siemens,
rie have each done their best to create a conflict of opinion, and
ity among the Scotch ironmasters, who now find themselves—
mazes lost,"—when they go forth in quest of new and better appli-
ough perplexed and fatigued, they seldom fall back upon Bianca's
affirmed—
fashions please me best;
I am not so nice to change true rules for odd inventions."
they have tried nearly every patent in its turn, so that now it is
ther than the rule to find the old reverberatory furnace in use,
orks it is nothing strange to find three or four of these different in-
side by side, the results obtained by each being carefully com-
of the others. I shall first refer to.
EAT-RESTORING GAS-FURNACE—which was first con-
e Govan Bar Ironworks early in 1864, and has since
the constant attention of the patentee. In the Coat-
t the furnace is now largely used, and I believe it yields,
highly satisfactory results. The gas which heats the
pplied from the ordinary coal or slack procurable in the
, but it is not necessary that the gas should be supplied
with the furnace. The principal novelty in the fur-
estorer, which is a chamber placed under the ground line, and con-
of fire-clay pipes open at each end. A wall runs up at each end
ding the chamber into three compartments, one large in the centre,
end of the pipes into which they open, connecting the smaller end
flame or waste heat from the furnace passes downwards through
rtment, impinging on the outside of the tubes placed therein. The
m enters the end space at the bottom, passes through the pipes to
ing to a higher series of tubes, and re-crossing till it arrives at the
er—the effect being an upward current of air meeting a downward current of heated gases with only the thickness of the fire-clay tubes between them, while the current of air inside prevents the destruction of the tube by the high temperature outside. This is the only extra about the Gorman furnace which has no counterpart in the common furnace. Experiments made at Govan Bar Ironworks in heating iron from a plate mill, to ascertain the exact yield of the Gorman furnace showed that it saved 1 cwt. 3 qrs. 19 lbs. of pig per ton of finished iron, as compared with the ordinary furnace. At the works of the Coatbridge Tin-plate Company, at the Clifton Ironworks, at Mossend, and at the Clydesdale Ironworks, Holytown, Mr. Gorman's furnace has been largely used. I may add that the patentee had patented improvements in furnaces so far back as 1852, and had shown how gas was produced and used in a puddling-furnace in 1853, before Siemens brought out his patent. The system of coking coal or carbonaceous mineral by the waste heat of a furnace—the principle which has been applied with such success by Mr. Ferrie to the blast-furnaces of the Monkland Iron and Steel Company—is included in a patent granted to Mr. Gorman, in connection with smelting and other furnaces; and he has also within the last two years devised several important modifications in his heat-restoring gas-furnace, of which, however, I have not now time to speak. Although constructed on somewhat similar principles, Mr. Gorman's furnace is so much simpler than that of Siemens that the latter has failed where the former achieved a complete success.

HOWATSON'S PUDDLING-FURNACE has been well spoken of by practical men, and seems to be increasing in favour. Two or three years ago the patentee had some trial puddling-furnaces erected in Scotland, which showed a saving of nearly 30 per cent. in fuel, besides a considerable percentage of iron. Circumstances, however, prevented the general adoption of the furnace at that time, and the patentee is only now erecting a complete forge on his plan. On the first of the current month he commenced to erect 30 of his furnaces at Mr. Colville's ironworks, Motherwell, and he expects to close negociations now pending with several other firms in Scotland for the use of his patent. I have a letter from Mr. Howatson, in which he says—"I am building a great many furnaces in the neighbourhood of Swansea, and doubtless they (or some better plan) will be generally adopted, as fuel is now a very expensive item in the manufacture of iron." The only Howatson puddling-furnaces in this district that I know of are at work at the Skerne Ironworks, Darlington, and appear to be giving satisfaction. At the Dudley meeting of the Iron and Steel Institute, in August, 1871, Mr. Howatson was set down for a paper on his puddling-furnace, and although I believed he shared with our estimable President, Mr. Head—who was to have read a paper at the same meeting on the Newport puddling-furnace—the disappointment of not being heard through lack of time, both papers will be found in the published proceedings of the Institute, to which I beg to refer gentlemen who may wish to see it fully described. Briefly stated, the speciality of the invention, which can be applied to an ordinary furnace at a cost of less than 5l., consists in supplying, by very simple means, hot instead of cold air to the grate of the furnace.

ELLIS'S PUDDLING-FURNACE AND DORMOY'S REVOLVING RABBLE.—I now come to speak of a furnace patented within the two last years by Mr. Thomas Ellis, of the North British Ironworks, Coatbridge. Externally this furnace is constructed in the usual way. The grate is enclosed with air-tight fitting doors. All the apertures for the admission of air to the bridge and flue jambs are also closed. At the flue end of the furnace, about the flue-bridge, an aperture is made through which a volume of air from a blast-fan is made to pass. This air is driven by the force of the fan under the bottom plates around the jamb and back wall plates, from which it takes up all the heat given off by the plates already mentioned. It is then passed by a suitable aperture at the fire-bridge into the grate, producing combustion of the fuel therein. A valve admits a quantity of the hot-air into the furnace through the bridge, which is made hollow for the purpose, and which in mixing with the gases from the fire-grate produces an intense heat, and consumes the smoke. The waste heat of the furnace, instead of passing up a stack in the ordinary way, is made to pass by suitable connections through a vertical tubular boiler, by preference made with a tapered shell with an internal flue. The flue is fitted with tubes crossing each other at an angle of about 45°. These tubes are not put directly across the flue, but have a dip sufficient to produce perfect circulation of the water. Members of the Iron and Steel Institute who visited Glasgow in August last will remember that one of the principal excursions was made to Coatbridge, and that much interest was felt in the operation of Dormoy's revolving rabble, which was being then tested for the first time in Scotland, at the North British Ironworks. The experiments were superintended by the patentee, M. Dormoy, in person, and it was intended that a paper on the revolving rabble should be read by Mr. F. A. Paget, C.E., but the exigencies of time compelled the abandonment of this arrangement, much, I believe, to the disgust of M. Dormoy, who had crossed over from France for the occasion. The invention will probably come before the Institute at a future time; but, meanwhile, those who may be desirous of making its further acquaintance will find it fully described in a paper read by Mr. Paget, before the Society of Arts, in May of last year. Mr. Paget believes that the revolving rabble will do for the puddler what the slide rest has done for the metal-turner, and urges that even if ironmasters were to use it merely to relieve their men, and without requiring a greater number of heats from them, they would gain—1. A great improvement in the quality of the iron produced.—2. A great diminution in the number of ruinous cobbles, or wasters.—3. The capability of working up very grey, or, also, inferior kinds of pig, without using any fined metal; and 4. A diminution of loss in mill scale between the rolls.

I am sorry to be compelled to add that an invention which promised to promote so materially the amelioration of the puddler's arduous lot, and to abrogate the severity of the hardest labour voluntarily undertaken by man, has not answered the expectations formed in its favour. After testing its merits most conscientiously, Mr. Ellis writes me to say that "meantime I have suspended my operations with the revolving rabble, as I do not consider in its present state it is thoroughly efficient. I have adopted my own patent heat restorer for both puddling and heating furnaces throughout my works, and they continue to work satisfactorily and effect the saving of fuel and the extra yield which is claimed for this patent."

SIEMENS' PATENT REGENERATIVE GAS FURNACE has been adopted on a very large and complete scale at the Blochairn Works, near Glasgow, and to a much more limited extent at the Parkhead Forge, at the Glasgow Ironworks, and at the Coats Works, Coatbridge.

Before leaving this part of my subject I may state that Mr. Ferrie, of the Monkland Iron and Steel Works, is now making experiments with the view of applying the principle that has proved so successful in his now well-known blast-furnace—described at the Dudley meeting of the Iron and Steel Institute—to the puddling furnaces at Monkland. As these experiments are only as yet in a crude state I am unable to furnish any reliable data respecting their results, but Mr. Ferrie expects to be able to save the 40 cwt. of coal now consumed per ton of bar-iron made at Monkland—including both the puddling and the finishing processes—by the application of the blast-furnace gases.

DANKS' ROTARY FURNACE has not been put to a practical test in Scotland, but a company—established in Glasgow about two years ago on the limited liability principle—have taken out a license for its use, and propose to erect a large forge on the system which has recently been a source of such intense interest in the Cleveland district.

In concluding this necessarily cursory and imperfect sketch of the Malleable Iron Trade of Scotland, I venture to hope that, if I have in any degree contributed to the knowledge already possessed by the members of this institute of an industry in which so many of them are vitally concerned, it may be urged as a justification—if any were needed—of the resolution lately arrived at, to so widen the basis of the society as to admit a lay element, whose main qualification to take part in its proceedings can only be a deep anxiety to improve their acquaintance with a trade which, in all its ramifications, is now advancing with amazingly rapid strides, and which is universally allowed to be the greatest source of England's redundant commercial prosperity.

NORTH STAFFORDSHIRE INSTITUTE OF MINING AND MECHANICAL ENGINEERS.

A meeting of this newly formed Institute was held on Monday evening at Stoke-on-Trent, the president (Mr. T. S. WILKINSON, of Silverdale) in the chair. Mr. L. Brough, of Clifton, Bristol; Mr. Joseph Dickinson, Pendleton; Mr. T. Evans, Belper; Mr. R. Moore, Rutherglen; W. E. Wales, Swansea; and Mr. J. Willis, Durham, Government Inspector, were enrolled as honorary members. Letters were received from each of these gentlemen signifying their approval of the objects of the Institute, and wishing the Institute success. Mr. Wilkinson, the president, gave an inaugural address, in the course of which he said the coal of the North Staffordshire district was deposited at all angles, from the horizontal to the perpendicular. The thickness of the seams varied deeply, and the gases were given off from them in some cases at intervals, and in others constantly, the quantity varying from much to little. The ironstone deposits were also presented in as great variety as those of coal, and they had likewise the Red Mines. This varied character of the minerals of the district made it peculiarly desirable that the mining engineers of North Staffordshire should meet together frequently to discuss the many difficulties to be contended with. This, he urged, they should do with the utmost frankness, both for the benefit of the district and of themselves. They should do all they could to enlist the sympathy and support of the mechanical engineers as well as of the mining engineers. They should also make an effort to increase the study of geology, mineralogy, and chemistry. They should direct their attention to the provisions of the Mines Regulation Act, so as to take steps for guarding themselves against undue oppression or arbitrary treatment. They should seek the co-operation of the other engineers of England, from which he was sure great advantages might be derived. The President's remarks and suggestions were favourably received, and a cordial vote of thanks was passed to him.

Mr. TEALE, of Manchester, was then introduced by the President to the meeting. He attended for the purpose of introducing to the members a Patent Safety-Lamp, which he explained possessed advantages over the ordinary lamps now in use. He said all must admit that the present system of lamps was very imperfect, and were easily tampered with. They gave very bad lights, and soon got out of order. He had studied for several years how to effect improvements in these respects. The result was the invention of a lamp which would save 50 per cent. in the cost of using it, while it would give an increase of 30 per cent. in brilliancy of flame, as compared with the present lamp. Then, in the new lamp there was an arrangement which would entirely dispense with the pricker. The wick did not burn down, and there was a small tube by which the light could be regulated to the smallest blue, while the action of opening the lamp will be sure to extinguish the flame, so that there would be no danger in entrusting it to the workmen. He lighted three lamps made on the same principle, and showed how they were lighted and how they were extinguished. In reply to questions, Mr. Teale said the lamps produced had not come into general use, but were being used in 150 pits. The original outlay was greater, but the saving in a short time counterbalanced the slight increase in the cost of the lamp.

Mr. OSWALD, of Harecastle, showed a Patent Magnetic Lock for Safety-Lamps, explaining that the magnet was confined in a strong box, kept at the bottom of the shaft, or in some other safe and convenient place, and the locks were so constructed that they could not be unlocked without the use of the magnet. Thus there was safety secured, and much time was saved in getting the lamps lighted when any happened to get extinguished. In answer to a question, Mr. Oswald said a magnet cost about 4l., but with care it would last 20 years. The principle had been adopted successfully for three years at the Harecastle and Woodshutts Collieries, and the men liked them because they were safe.

It was understood that the members would consider the merits of the lamps, and discuss the same at the next meeting.

A conversation took place with reference to the tardiness with which the certificates for colliery managers were given, but it was thought advisable to allow the two months' grace to expire before taking action, if even the question came within the scope of the rules of the Institution, which some of the members seemed to doubt.

It was stated that the finances of the Institute were in a satisfactory state. At the close of the meeting the members, of whom there was a large attendance, dined together at the North Staffordshire Hotel, the President occupying the chair, and Mr. C. J. Hower the vice-chair.

Meetings of Mining Companies.

CAPPAGH MINING COMPANY.

An extraordinary general meeting of shareholders was held at the company's offices, Finsbury-place South, on Tuesday,
Dr. ROGERS in the chair.

Mr. J. H. THORNTON (the secretary) read the notice convening the meeting, which stated that the business to be transacted consisted in considering a resolution to the effect that it had been proved to the satisfaction of the shareholders that by reason of its liabilities the company could not carry on its business, and appointing a liquidator to wind-up voluntarily.

The CHAIRMAN said, that a week previously they had had a meeting and discussed the matter, the result being that, although it was felt that they could go no further without additional capital, the position of the mine did not justify its abandonment. They had, therefore, called another meeting for that day in order to afford the shareholders an opportunity of taking up shares, and also to request Capt. Thomas to be present to give the shareholders every information that they might desire to have as to the position of the mine. He had come over at some inconvenience to himself, but he believed his presence would be gratifying to the shareholders, especially as he had brought up samples with him from the deepest point in the mine, which were very rich, and far superior to anything they had seen nearer the surface—[the samples consisted of portions of a solid vein of clean purple copper about 5 inches thick, and large rocks of lode-stuff containing about 18 or 20 per cent. of similar purple ore, embedded in carbonate of lime sufficiently friable to permit of very economic dressing]—showing that the mine really contained valuable ore, and that it improved as they went deeper. But they had to consider the question before them in two parts—firstly, as to the raising of the money; and, secondly, as to the result to be expected if they did. They felt that in order to go on satisfactorily they ought to place 2000 more shares. The directors had undertaken to subscribe for a certain number of those shares, but he regretted to say that their co-shareholders had not come forward with the same amount of zeal as had previously been shown by the directors. At this moment it was difficult to raise money for anything, but in their case there was every prospect if funds were raised that success would crown their efforts. The specimens before them were certainly exceedingly fine, and much more like the rich South American ores than any which he had previously seen from England or Ireland. They had everything in most capital order at the mine, and, as they could see, some portion of their lode was almost solid copper, and some of the ore contained a valuable proportion of silver—87 ozs. to the ton—so that they might consider they had two strings to their bow. Capt. Thomas would afford them every information in his power. They had a large quantity of ore, but it was necessary to have the means for working it and bringing it to market. They believed that if 2000 shares were taken up it would be sufficient for their purposes. Of this number approaching 1200 had been already subscribed, of which a large proportion had been taken by the directors, and he did hope that the other shareholders would come forward and assist them. The company was really not in debt—that is to say, the directors were themselves almost the only creditors, as well as the largest shareholders, but in the next three months they must have more money than the returns from the sales of ore would provide them with.

Capt. THOMAS remarked that he had been 32 years in Ireland, and that although he was well acquainted with the locality of the Cappagh Mine, and, in fact, with the whole of the South-West of Ireland, he had not until about two years ago been connected with its management. In sinking the last 20 fms. a decided change and improvement in the character and value of the lode had taken place, and a very important point would soon be reached in sinking the skip-shaft under the 115. The north and south lodes underlying towards each other would, from their present dip, form a junction in about 9 ft. below the bottom of the shaft. The north lode is over 2 ft. wide, and consists of very rich purple ore, intermixed with carbonate of lime, &c., and worth from 40l. to 45l. per fm. The south lode is over 1 ft. wide, and contains solid ribs of ore, from 4 to 6 in. wide, which will yield over 50 per cent. of pure copper. Those lodes converge going west, and will soon form a junction, and about 20 fms. beyond the 104 fm. level end there is a large cross-course, and it would be most important to push the 94, 104, and 115 fm. levels west to intersect the great cross-course, as a fine run of ore was found in contact with it from near the surface to the deepest level in which it has been intersected. He strongly recommends those levels to be pushed forward as fast as possible, and winzes sunk at proper intervals so as to stope the ore ground to best advantage, also to drive the 115 fm. level end east, and sink the skip-shaft with all possible speed; there was everything to warrant this work being done, as the lode in the bottom level is far more valuable than in any level above—in fact, breaking the lode altogether it would give a produce of 16 per cent. or more. A small oblique vein of silver-lead ore falls into the north lode at the 104, and in the bottom of the skip-shaft the silver-grey ore gives 87 ozs. of silver to the ton of ore, and 46 per cent. of copper. The pitwork is in first rate order, also skip-shaft, plats cut, &c. There are no explorations required, but simply to open the levels and shaft, as suggested, in order to make the mine dividend-paying. At surface there are powerful steam pumping and hauling engines, and crusher attached, with copper yards, dressing-floors enclosed, with all appliances complete; also workshops, store-houses, offices, dwelling houses, &c. The mine is in complete working order, and the capital required is for opening the mine in a proper manner, so as to make permanent returns.

Mr. THORNTON enquired the thickness of the rich portion of the vein to which Capt. Thomas had referred?—Capt. THOMAS said that the stone of purple copper on the table represented the rib in the south lode, and was 6 in. wide; the lode was considerably wider, the rib being merely the middle of it. This would in about 9 ft. further sinking form a junction with the north lode—in fact, at the present time both lodes were in the shaft, and he had never known an instance of two such lodes failing at the junction to make a large deposit of rich ore.

The CHAIRMAN understood Capt. Thomas to be of opinion that when the rich vein united with the poorer a larger lode will result, and both will be rich.

Capt. THOMAS replied in the affirmative; and, in reply to further questions, stated that there were no material faults to interfere with them; there was a small one in the shaft, but it was quite an unimportant one. They had two large engines at work, and there was the smithy and other shops consuming it, yet they did not use more than 20 tons per month. There was no difficulty whatever in raising, shipping, or selling the ore—indeed, they had their own harbour close by, and the same vessel that brought them their coal could carry the ore back. They had no expense for timbering, as the ground was strong enough to support itself. The rich ore he had referred to assayed 46 per cent. for copper and 87 ozs. of silver to the ton; they had not sold any of the argentiferous ore, but had, perhaps, about 3 cwts. on hand, and were gradually accumulating it. He would soon be in a position to send a parcel to market. After reaching the junction they would continue sinking on the lode. They had also an oblique vein of silver-lead ore, which would in a little time prove very valuable to them. They had no difficulty with regard to labour; the men were all as well behaved as anyone could wish. He had been 30 years in Ireland, and had never had any difficulty in dealing with Irishmen; all that he found necessary was to treat them fairly, and never break your word with them. They were now well paid and satisfied.

Mr. SMITH said that their position appeared to be that Capt. Thomas wanted 300l. per month for six months; the directors had that morning been going through the list of shares subscribed, and although they felt that it would be highly desirable to place the whole 2000 shares, as that would permit of the calls being less frequent, they were of opinion that they would be able to go on with the number already taken.

Capt. ISDELL said he had been to the bottom of the mine, and had no doubt as to the existence and value of the ore. He enquired how long Capt. Thomas anticipated it would take them to reach the junction of the lodes?

Capt. THOMAS had told them there were but 9 feet to sink, and would think they would reach it in about five or six weeks. After reaching the junction they would sink and drive as before; but they would then have good stoping ground to supply them with ore for market. They were getting out some ore in sinking, and what they had sent to Swansea was worth 24¼ per cent., and had fetched the highest price of any Irish ore sold there.

Mr. ROYNON was quite of the opinion that they should go on with the mine, but considered that they should use every effort to get out the whole 2000 shares.

Mr. MULLER only attended on behalf of his brother, and was not a shareholder himself, but certainly entertained the same opinion. He understood that they were already getting some revenue.

Mr. SMITH said that they were; they were at present raising 150l. worth per month, and that was the reason they anticipated not having to make the calls too quickly——Mr. MULLER was himself quite satisfied with what he had heard, and had no doubt his brother would take up some of the additional shares when he reported to him the result of the meeting.

Capt. THOMAS remarked that they were getting 150l. worth of ore per month,

although the mine was only 115 fathoms deep. In Ballycummisk they were down 220, and had been improving in depth all the way down.

The CHAIRMAN could assure them that if he had not considered the mine a valuable one he would not himself have taken 710 shares.

Mr. ROYNON did not think the value of the mine was questioned. He was himself quite satisfied with the value of the property, and had full confidence in the directors.

The CHAIRMAN said they had heard Captain Thomas's opinion, and knew the opinion of the directors, so that the question would be whether they should issue the shares applied for or, he had almost said, be foolish enough to throw it up. It was plainly set forth that the ore existed, and he certainly thought that they ought to make an effort to get it.

Mr. MULLER enquired whether there were any great liabilities to be paid off?

The CHAIRMAN said the principal were due to the directors, and from 500*l.* to 600*l.* would clear off everything.

It was then moved by Mr. ROYNON, seconded by Mr. MORKILL, and carried unanimously, that the shares subscribed for should be allotted, and that steps should be taken to get the whole 2000 placed; and the secretary was directed to see that the proper forms were lodged with the Registrar.

The proceedings terminated with the usual complimentary vote of thanks to the Chairman.

SILKSTONE FALL COLLIERY COMPANY.

The ordinary general meeting of shareholders was held at the London Tavern, on Thursday,—Mr. GEORGE WELLS OWEN in the chair,

Mr. MINSHULL (secretary) read the notice convening the meeting.

The report of the directors stated that in the year which has just closed the working of the collieries has proceeded steadily, without accident or hindrance of any moment, except that which has arisen from the excessive rainfall. At starting the directors were very much hampered by old contracts at low prices, but in some cases they have succeeded in getting the contracting parties to meet the great advance which has taken place in the labour market, and in the price of materials, by giving an advance on the contract price of coal, and at the present time most of the contracts have run out. To meet the great demand for coke the directors have added to the coke ovens, and will shortly have 60 in place of the 26 with which the company commenced business. The directors are further able to report that they have made a provisional agreement with Mr. W. S. Stanhope, M.P., to extend the area of their present coal fields by a new lease, which will give the company 1,000,000 tons more coal. Additional sidings have been laid down to meet the requirements of an extended trade, as ordered by the shareholders at the last general meeting. The wagon works have been completed, and are in full work: fourteen new wagons have been built, and a good deal of repairing work done for customers, and the orders on hand are sufficient to keep the works going for some months to come. The profits to Dec. 31 have amounted to 4459*l.* 7s. 2d. Out of this sum three interim dividends to Sept. 30 have already been paid, amounting to 1368*l.* 9s. 2d. The directors now recommend that a dividend for the last quarter be paid, at the rate of 25 per cent. per annum, leaving a large balance to be added to the reserve and redemption funds.

The CHAIRMAN said that the report had detailed the result of the working of the past year. The working of the colliery was being pushed on as successfully and profitably as it possibly could be. The property originally purchased consisted of 100 acres, but arrangements had to a certain extent been concluded by which an extension of the coal field had been obtained, which would give the company 1,000,000 tons more coal. The ground was close to the present shaft, therefore the coal could be very easily extracted. The accounts spoke for themselves; some shares had been sold at a premium, and it had been determined to carry the amount so received to the credit of the reserve fund and placed against preliminary expenses, and thus gradually wipe them off year by year; the sum of 460*l.* placed to the reserve fund was derived from the premium on shares, having actually carried nothing to the fund beyond that amount: but there was a considerable balance of revenue, and the board wished to take the sense of the shareholders as to its disposition. His impression was that the reserve fund should be allotted to pay off the preliminary expenses, and to apply 1000*l.* towards the redemption fund. It seemed scarcely advisable while they were paying such good dividends upon the shares to invest the redemption fund at 3 or 4 per cent., and especially when it was necessary to build cottages upon the property for their workmen; as a long lease could be secured, it seemed the best application of that fund would be in the building of these cottages, therefore the board proposed to invest the redemption fund in that way. They were about to lay down another siding and considerably increase their coke ovens and waggon works. At present they could turn out about 12 wagons a week, but would shortly furnish 24; their wagon works had been paying remarkably well. The colliery had been worked under disadvantages in consequence of there having been a good many old contracts, but many of them had now nearly worked out, some of which had been worked at a loss—therefore, the high prices of coal, bringing higher rates of wages, did not always mean large profits to the colliery proprietors. As far as this company was concerned, however, the old contracts were nearly worked out, so that they would soon reap the advantages of high prices. (Hear, hear.) Taking every circumstance into consideration, he felt he was perfectly justified in expressing the strongest opinion that the profits for the current year will largely exceed those for the period embraced in the accounts now before the meeting. (Hear, hear.) He then moved that the report and balance-sheet be received and adopted.

Mr. NICHOLSON seconded the proposition.

Mr. STURGES said the directors were fully entitled to the thankfulness of the shareholders for the manner in which they had managed the affairs of the company; and he congratulated his brother shareholders upon the possession of a very valuable property; but still he thought the directors had made some mistakes, which the present meeting should take into consideration, and to say whether they should be allowed to repeat them, or whether they should be asked as far as possible to amend their course. His first objection was to the agreement between the directors and Mr. Booth, their worthy and able manager, and Mr. Nicholson, formerly, he believed, the salesman to the colliery. This agreement was that each of those gentlemen should be allowed 3 per cent. on all coal brought to the pit's mouth as a remuneration for the services which they rendered to the company. He asked Mr. Booth, in whom he had the greatest confidence as a man of honour, as he also believed was Mr. Nicholson, although he did not know him personally, to allow that contract to be voided, and that the directors should review the steps taken.—Mr. BOOTH said he was quite prepared to place the agreement in the hands of the Chairman or any other gentleman—the contract referred to—and to receive any rate of remuneration they might determine. (Hear, hear.)

Mr. NICHOLSON would have much pleasure in doing the same, although the shareholders in their own interests should review the results achieved under the existing arrangements. (Hear, hear.)

Mr. STURGES then proceeded to refer to the arrangement the directors had made with Messrs. West and Co. for the sale of the company's shares.

The CHAIRMAN said that although directors' minutes were always regarded as private he might state that the contract which the directors had made with Messrs. West and Co., which was open to the inspection of any shareholder, was made in the true interests of the shareholders, as might be imagined when he informed the meeting that the board held among them one-third of the entire capital stock of the company. (Hear, hear.)

Mr. STURGES moved as an amendment that the reception of the report and balance-sheet be adjourned, and that in the interim a committee of shareholders investigate the company's affairs generally.—Mr. WHITEHEAD seconded the amendment.

The CHAIRMAN said that he had been entrusted with proxies representing a very large number of shares, but it was not his interest to use them unless in the promotion of the true interests of the company. (Hear, hear.) As opposed to the present amendment, he should not use them. (Hear, hear.)

The CHAIRMAN said the proposed dividend would absorb about 1900*l.*, leaving about 1100*l.* to carry to the sinking and reserve fund, in addition to the 400*l.* received as premium on the shares, the par, of course, being placed to the credit of capital account.

A SHAREHOLDER suggested that the Articles of Association should be amended, in as far as a statement of accounts should be sent out to the shareholders prior to the general meetings.

The CHAIRMAN said there was not the slightest necessity to amend the Articles for the purpose, for if it were the wish of shareholders that the accounts should be sent out prior to general meetings he would, on behalf of the board, pledge their assurance that it should be done. (Hear, hear.) He had personally taken a considerable amount of trouble about the accounts, and had succeeded in placing them in good order.—Dr. SMITH (a large shareholder) considered a committee of investigation altogether unnecessary after the very handsome way in which the manager and Mr. Nicholson had come forward. If those matters were left with the Chairman and directors the wishes of shareholders upon the subject would be fully met.

Mr. NICHOLSON said when he took the position he now occupied his first act was to conclude a contract for a large amount of coal, by which the company saved considerably more than the whole of the remuneration he should receive this year. (Hear, hear.) Although the trade had now become so good, it did not lessen the amount of time and energy required in watching the market and making the best terms for the company. Whether his exertions had been attended with success he would leave the board to say. He had to pay every shilling of his travelling expenses, and if he last year cleared 400*l.* it was the outside sum. He negociated the sale of the colliery to the company, and had done a very large amount of work in the matter. The contract between Mr. Booth and himself and the company had turned out most profitable to the company, and he did not think any shareholder had any cause to complain, seeing they had received a dividend of 25 per cent. As to the reserve fund, he maintained the best possible security they could have was its investment in the company's works placed on their own property.

Mr. BOOTH said he had arranged upon most satisfactory terms for a plot of land upon which miners' cottages could be built, and the cost of the erection of which was a safe and proper mode of employing the reserve fund.

Mr. BOOTH, in reply to a question as to the terms upon which the extension of the coal fields had been obtained, stated, as Mr. Stanhope's mineral agent, he felt it his duty to advise a slight increase in the rental, amounting to 20*l.* per acre for each seam.

The CHAIRMAN said that 1000*l.* would be set aside as a sinking fund, and more would be set aside as the board considered necessary.

Mr. STURGES withdrew his amendment, expressing a confident opinion that the property would become one of the most profitable in Yorkshire.

The report and balance sheet was then received and adopted unanimously.

Mr. J. Nevill was re-elected director, and Dr. Hollings (of Wakefield) was elected a director, and the sum of 400*l.* was voted to the directors as their remuneration for the ensuing year.

Upon the proposition of Mr. BIVEN, seconded by Mr. WEST, it was resolved that the offices of the company be retained in London.

Upon the proposition of the CHAIRMAN, seconded by Mr. STURGES, it was also resolved that the sum set apart for the sinking fund in redemption of the capital be invested in building cottages for the workmen on the plot of land leased to the company.

The CHAIRMAN, in reply to a question, stated there were 2303 unissued shares, including those in the hands of Messrs. West and Co. Any the company issue will receive 2*l.* prem., but the contract with Messrs. West and Co. was that for the balance of shares in their hands the company received one-half the premium.

A vote of thanks was passed to the Chairman and directors, and the meeting then separated.

POLBREEN MINING COMPANY.

The first account day for the present year was held at the account-house on the mine, on Thursday, Feb. 6,

Mr. Y. CHRISTIAN in the chair.

The financial statement presented showed an expenditure as follows:—Labour cost for 16 weeks, 1358*l.* 0s. 7d.; materials, including extras for stamps, coals, and general plant, 487*l.* 7s. 3d.; interest and discount, including discount on calls, 6*l.* 10s. 3d.; debit balance from last account, 451*l.* 11s. 5d.: total, 2303*l.* 9s. 6d. The receipts were from sale of tin, at an average price of 85*l.* 3s. 9d. per ton (less dues, 28*l.* 16s. 3d.), 547*l.* 10s.; leaving a debit balance of 1755*l.* 19s. 6d., to meet which and provide a balance in hand it was proposed to make a call of 20s. per share.

The report on the progress of the underground operations, presented by Captains J. Nancarrow and J. Bryant, was then read, as follows:—

The report we have now to present to you will bring to your notice a more favourable incident in the progress of Polbreen than any we have to relate for some time past. Our operations have been steadily progressive throughout the sett, but the opening on Wheal Kitty lode is a matter of very high importance, as one that is likely very rapidly to advance our approach to dividend.—Flat Lode: The winze below the 22 north is holed to the 32, by which means that level is now well ventilated for a considerable distance northward. The lode near the cross-course is small, but we may rely on its improving when opened out. A pitch below the 12 has improved, and looks very promising. The cross-cut in course of driving south of Christian's shaft has not yet reached this lode.—Dorcas Lode: The pitches on this lode continue to be worked, and are producing tin.—Tregay's Lode: The winze sinking below adit, east of Christian's engine shaft, is holed to the pitch above the 12, which is looking better than it has for some time past, the lode being worth 2*l.* per fathom. The 12 end, east of Christian's shaft, did not improve so soon as we expected, but we have some nice tin recently come into the end of the ground we have been driving through, and our expectation of having a good lode here seems on the point of being realised. The pitch below the 12 is holed to the rise above the 22, and continues to look well; lode worth 2*l.* per fathom. The 22 west is now well ventilated, which is a great advantage for driving. The pitches in this level continue to yield good tinstuff, some of which is now exceedingly rich. The lode in the 32 west has been disordered, but our experience teaches us to look for an improvement as we get westward under the tin ground in the 22.—Wheal Kitty Lode: This lode, which we consider to be cut in the bottom of Nancarrow's shaft in the 22, is seen in the 32 north between two parts of the cross-course, and there yields good stones of tin. We have driven westward through the western part, and then northwards towards the lode, which is thrown north: the ground in the end is changing, and we are evidently getting near the lode. When it is reached we shall drive on it westward under Nancarrow's shaft. In this way we look to open up valuable tin ground, drain the shaft, effect a communication, and so lay open a new mine. In the east end, in the adit, the lode is large and strong, is now worth 8*l.* per fathom, and likely to improve: there is also a stope behind this end worth about 8*l.* per fathom. This is the lode now giving all the profit in Wheal Kitty, lying just to the east of us, and is the grand point aimed at by all the miners in the district: it is standing whole nearly throughout Polbreen, and the development cannot but be attended by the best results to the shareholders.—General Review: Our sales of tin since our last meeting have not been quite so great as we had a right to calculate on, but this temporary deficiency would not have considerably affected our position, as our getting behindhand is to be ascribed principally to the general advance in the price of everything employed on or about the mine. Our coals stand us in more than double the usual rate. All other materials have risen in a somewhat similar proportion. In addition, we have to pay higher wages for our labour. All these differences have greatly augmented the amounts of our month'y cost-sheets. We can see our way to diminish some points of expenditure, while we may count on increased returns from Wheal Kitty, Tregay's, and the flat lodes, and on a reduction of the extraordinary prices we have now to pay for most of our requisites. We have 90 persons employed. The average of our tribute is 9s. in 1*l.* The engines and machinery are in good order, and all working well.

The CHAIRMAN said that the necessity of once more applying to the shareholders for assistance to develope the resources of the Polbreen Mine would have been a very unpleasant step for the committee to have decided on, or for him to have defended, were it not that the mine, as shown by the report just read, was exhibiting greater stores of mineral than ever, and that the unexampled and general rise in price of everything that entered into their working expenses had entirely defeated all former attempts at calculations and foresight. The rise in price of every commodity in use in a mine, or, indeed, in any kind of business in the carrying on of which steam power and machinery play an important part, had been for so many months the constant matter for record and comment in the daily and weekly journals, that it would be quite superfluous for him to reiterate what they all knew, and had, no doubt, been made perfectly conscious of by their own increased expenditure even in mere household matters. Polbreen was then, he believed, paying 34s. or 35s. per ton for coal that used to cost it but 16s. or 18s.; and everything else had risen somewhat in the same proportion. He thought he was correct in stating that the extra expenses of the mine during the past 12 months, caused by the advance in prices, amounted to a sum nearly equivalent to a dividend of 15s. per share. That extraordinary state of things could not be maintained. Men could not remain on strike for an indefinite term, nor could any combination of coalowners or ironmasters keep up prices to an extent that, by crippling trade, must in the end recoil to their own disadvantage. With reference to the shareholders' part in the matter, he would but say that every effort would be made to exercise a proper economy in the management of the mine. They had now 90 people employed instead of 110 or 120, for, of course, it was deemed prudent to cease operations in one or two parts of the mine that were not yielding tin to save or for profit. Works in the nature of further exploration had been suspended for the present as far as could be done consistently, and their strength was being directed to those portions of the sett that promised immediate and paying returns; and of such portions, as the report showed, they had a sufficient number to give them not only encouragement, but, he might say, increased certainty of the success they had been looking for. It was impossible to speak in moderate terms of the prospects opened before them by the discovery, or rather recovery, of the Wheal Kitty lode. That lode had been relied on from the first as something that must sooner or later add vastly to the value of the Polbreen Mine; but, though never despaired of, it was not till just before Christmas that it was met with. That lode, from which Wheal Kitty, a prosperous and dividend-paying mine, was now drawing the bulk of its profits, was being eagerly looked after by other mines in the St. Agnes district. They had been the first, however, clearly to identify its western course within the Polbreen sett: and, more than that, they had the happiness to find that it stood in whole ground—in ground hitherto untouched—throughout its entire course within their bounds. He believed he was right in describing the lode as 5 ft. wide, and when they had carried out all the plans formed for its development they would positively have at their command what the report correctly termed a new mine. The dividends of the Wheal Kitty Mine had gradually increased from 12s. per share in 1869 to 2*l.* per share last year. What the Polbreen dividends might rise to there was some ground for judging when it was recollected that Wheal Kitty was now operating on the 130 fm. level, and they, at Polbreen, had met with the lode in clearing at their 32 fm. level. There were other points in the report that were full of encouragement. It was evident that Polbreen was getting all its present levels well ventilated, without which a mine could never to said to be within the power of the worker. Communications, too, had been made from one level to another, and at every foot thus gained indications of mineral wealth had been opened upon. He thought their sett was growing into a mine, as their underground works were being sunk and extended in all directions. They were making monthly sales of tin, and if not as yet to the extent anticipated, their supplies were certain to be augmented, for the sources they drew them from increased in number every month. The difficulties of the past year, which they were now, he hoped, about adopting means to surmount, had not been difficulties within the mine, but difficulties external, that could not be foreseen, and which they had to bear in common with every other mine in the kingdom. He was satisfied, and he thought those present would share the conviction, that however unpleasant the demand they had now to meet, the future before them was of a brighter hue, and that the Polbreen shareholders would soon have to rejoice at the knowledge that the mine was paying its expenses; next, that profits were accumulating; and then that the dividends were at hand which they had so much merited by their patience and perseverance. (Hear, hear.)

A SHAREHOLDER observed that it would appear from the statement of accounts that their produce of tin had seriously fallen off. He wished to ask if Captain Nancarrow had any explanation to offer on that point?

Capt. NANCARROW replied that the falling off was but in appearance. Their last statement of accounts embraced one sale of tin more than the present. The weather and other circumstances had prevented them from getting a parcel ready for the smelter in time to include it in this account; but they would sell that parcel next week, and that would have brought up their produce to much nearer the usual quantity. But the continuous rains had been a great hindrance to mining operations, both underground and at surface.

The accounts and report were then adopted, the committee of management re-elected, and the proceedings closed with the usual vote of thanks to the Chairman.

WEST POLBREEN MINING COMPANY.

This mine held its account-day for the 16 weeks closing the year 1872 on Thursday, Feb 6,—Mr. Y. CHRISTIAN in the chair.

The accounts showed an expenditure on labour and materials of 386*l.* 13s. 2d., making, with interest and discounts, and dues on ore sold, 2*l.* 19s. 10d., a total of 389*l.* 12s. 5d. A balance is thus left in favour of capital of 212*l.* 1s. 2d.

The report of Capts. J. Nancarrow and J. Bryant was then read, as follows:—

Since the last meeting of the shareholders our operations have been confined exclusively to the western part of the mine. The unprecedented rains, of full 14 months' duration, have, as may be supposed, seriously interfered with work at a mine on which it was not intended to go to the expense of steam-power till the natural progress of its development positively required such assistance.—No. 2 Lode: There has been but little done on this lode, the water still hindering us. I must repeat what I stated in my last report—"Appearances indicate that the lode will be productive as we go deeper."—No. 3 Lode: This lode turns out very well, and some good tin ground opens up. We have broken more tin here than has ever been broken in the whole mine since we have been working it. The men are working on tribute, at 7s. 6d. in 1*l.* The men are earning fair wages, worth 12*l.* per fathom. We are driving east and west on this lode, and are out considerable promise, and is likely to improve, especially on the west end.—Wheal Lode: The shaft has not been sunk since the last meeting, owing to the water, which has also prevented us from working the tin ground already opened. The pumping was commenced under it, previous to the last meeting, was continued with but little intermission till the last week, when the water was let down and the sinking again effected. Not being so large as the shaft, the rise has to be cut, and this will take about a month to complete it to the adit level. We expect, however, to get some good tinstuff in doing this work, and the tin ground above the adit level will be ready for stoping.—General Review: It will be seen that we have been able to work some of our tin ground, in consequence of the water having been got down we are in a much better position for progress, and shall be able to go faster. There is already a quantity of tin broken on the mine, and parcels from Polbreen will soon make a regular appearance in the market with tin of the best quality St. Agnes can produce. As our operations proceed the mine exhibits greater deposits of mineral, and the prospects of profit for the future become more certain and satisfactory.

The CHAIRMAN said that the report they had heard was moderate in its tone, and he must say that their friend, Capt. Nancarrow, as he could judge, never led them to expect more than he thought at hand. But he had in hand, he believed, more than appeared on the report, for it required a thorough acquaintance with the history of the mine to estimate correctly the marvellous progress they had made within a year in the face of difficulties that could not be removed, but, to do them justice, had been most skilfully evaded. When he said this he wished to forget the services of his young colleague, Capt. Bryant, who had an active and vigilant servant. There was no doubt their operations impeded to a very large extent by the presence of water—a source of fear to the miner. On that point he made no defence nor apology. They had prognosticated such falls of rain as had lasted without intermission from December, 1871, possibly they might have taken precautions against which they were anxious to avoid. And, after all, precautions would not have availed against the deluge of rain that had fallen. The water, however, as they had told them, had been made to find a vent by the simple process of allowing it for it to flow out by the adit. West Polbreen had run no danger from water, and never would run that danger. Nay, the very danger had proved a benefit in holing to let out the water they had come on a lode of tin, which, when developed and fairly opened out, would be of itself alone very nearly sufficient to meet the present expenses of the mine. He had the pleasure of telling the shareholders that the small parcel of tin they had sold by way of sample had realised a fair price of the day. That was the verdict of the smelters as to the quality of the tin. They had gained a still more satisfactory verdict in the pockets of the tributers—the men who take a share of the ore they raise—and they are now convinced of the riches to be drawn form West Polbreen. He had at the last met the first pitch they had ever set had been taken by a pair at about a third of the value of the ore they might raise. Now the quantity as well as quality, and this testimony of theirs to the merits of the mine was conclusive on both points. They knew that not only was the ore good, but that West Polbreen had plenty of it to offer them. He was pleased to hear that the men had not been deceived in their estimate. A two-thirds, is a very common rate for tributers to receive, but at the same time these men are making good wages for themselves. Bit by bit West Polbreen showed that it was, in miners' phrase, thoroughly opening out. He was persuaded that but for the rains he should have been able to say that they were not far from making considerable profits. He would tell them the truth of what was stated at first, that West Polbreen could not pay its power till it had found the funds to pay for its engines and machinery, without asking its shareholders for a farthing. He thought after the experience of the past two years he could almost venture to go farther, and say that it was only put by profits for its machinery, but at the very same time it was a beginning of dividends to its shareholders. (Hear, hear.)

In reply to a question, Capt. NANCARROW said that the consumption of rise, though which the water had been let down, had been effected in much less time than he had reckoned on, and he hoped the same good would attend the further enlargement of the rise.

The accounts and report having been adopted, the meeting separated with the usual complimentary vote to the Chairman.

EAST LLANGYNOG MINING COMPANY.

The annual general meeting of shareholders was held to-day, at the Clarence Hotel, Manchester. There was a full attendance, and the proceedings, which lasted nearly three hours, were of a stormy character. The Chairman of the company, Mr. Moss, of Sheffield, presided.

Mr. TAYLOR (the managing director) read the report of Messrs. Pascoe and Grenfell. The former report, after giving a detailed account of the work accomplished since the last meeting, concluded as follows:—"You have larger courses of ore in the mine, but I have never seen it looking so well as it does now. A course of ore in the north and south part of the mine, on the same level, is a pledge that the ore is going down, and this confirms my opinion that in East Llangynog you have a very great and valuable property." The present report gave the result of a careful inspection of the mine, both underground and surface, and he expressed his opinion that the mode of working was a good one, like and justifiable, and that the future prospects never looked so well as at present, both for durability and profit. The machinery was in good order, and as well adapted for dispatch and economy in dressing as any in the United Kingdom. The severity of the weather, however, was against them interfering with the dressing, and consequently the next parcel would not be up to the mark against the day.

The directors' report and balance-sheet were next laid before the meeting. The directors stated that they had hoped at the forthcoming meeting to declare a dividend, but from various circumstances they were unable to do so. They had, however, great confidence in the ultimate success of the undertaking, and the work necessary to secure the desired result with all possible vigour. The balance-sheet showed that 4760*l.* worth of ore had been sold since the last meeting, and had a little overpaid the working cost and alterations which had been necessary.

The CHAIRMAN having asked whether any gentleman present had a question respecting the reports just read, a sharp and somewhat personal discussion followed, in which several of the shareholders gave expression to complaints relative to the management, and a reduction of the expenses by combination of the duties now performed by several officials was advised. Doubts were also expressed as to the fitness of Capt. Pascoe and Mr. Taylor, who jointly held of agent and managing director.—Mr. BEADLE observed that only 21 tons per month had been returned from this extensive mining property, whereas 50 tons per month were promised.—The CHAIRMAN asked whether any gentleman intended to throw doubt upon the correctness of the accounts?

Mr. WHITEHEAD wished to know whether Capt. Pascoe considered the reserves of ore which were now visible, were as good as they were at the last meeting?

Capt. PASCOE replied that the report had answered the question. He could say that at the time of the last meeting they had a better course of ore than at present, but notwithstanding this the prospects of the mine were improved, as they were 9 fathoms deeper, where they had ore in large bodies. At the last meeting they had a ridge of ore 8 in. to 1 ft. wide; the character of the lode was improved, and he believed they had a rich piece of ground before them.

The CHAIRMAN said it was now his duty to move the adoption of the report which had been read. At the previous meeting the directors had expressed a hope that at no distant date dividends would be regularly paid, and the realisation of the mine at the time he thought the directors were justified in entertaining that hope. The report which had now been presented to the meeting explained in a plain unvarnished manner the reasons which had prevented them from realising those expectations. Some months ago the 18 in. course of ore which had been discovered disappeared, he believed, in consequence of what was called a fault, and that, of course, was a matter of very great importance. In the next place, the additional machinery which had been ordered at the previous meeting was delayed for many months, and so a great amount of time was lost in that way. Then, again, they had had a most unfavourable season for operations. He would scarcely venture to say how long this had been, but he knew during a very great portion of the time which had elapsed since the last meeting the weather had been very unfavourable. The directors now came before the shareholders with a plain statement of what they had been doing, and what they had been aiming at. They had now come upon a solid ridge of lead, which would continue to increase. In addition, the general appearance of the mine was very encouraging. The attention of the directors during the past year had been, as previously, directed not to getting out all the lead they could but to the particularly favourable point, but to opening out the mine generally, and thus the future prosperity of the undertaking. After referring in high terms to Capt. Pascoe, whose abilities and attention to the interests of the company he eulogised, the Chairman concluded by moving the adoption of the report.

Mr. MEGINN seconded the proposition.

Mr. CARR, after stating that they were 387*l.* 8s. 7d. worse off than last year, proposed as an amendment that a committee of investigation be appointed to enquire into the affairs of the company, and to obtain the services of two mining engineers, whose expenses should be paid by the company, and that the meeting be adjourned until May next to receive the report.

Mr. CHILD seconded the amendment.

Mr. TAYLOR said it was very easy to account for the discrepancy referred to by Mr. Carr. During the last nine months a good deal of work had been done which could not be remunerative, and no additional capital had been asked for, the amount they had realised had been sufficient to pay these expenses. He then proceeded to reply to the strictures passed upon the officials of the company, and to the earlier part of the proceedings, and said that so far as his remuneration was concerned he thought he positively saved fully that amount every year.

Mr. ENDEAN said he had come to the meeting to protect the interests of himself and clients who were not present. He had every confidence in the directors whatever in the management.—The amendment proposed by Mr. Carr was then withdrawn until a later stage of the proceedings, the Chairman having agreed to.

The CHAIRMAN next moved that Mr. Meginn be re-elected a director. Mr. TAYLOR seconded the motion.—Mr. WHITEHEAD asked what qualification was required to act as directors, and was informed that only two gentlemen, residents of Leeds, and Mr. Thos. Eaver, possessed the requisite number of shares.—Mr. Denton had sent in the notice required by the articles.—Mr. BEADLE moved as amendment that Mr. Denton should be elected in the place of Mr. Meginn.—Mr. NASMITH, as a rider, proposed that both Mr. Meginn and Mr. Denton should be appointed.—Mr. FARLIN seconded this proposal.—Mr. BEADLE withdrew Mr. Howe's amendment.—After some further discussion, Mr. Nasmith's proposal was agreed to by a large majority.

The CHAIRMAN moved the re-election of Mr. Baxter as auditor, which was seconded by Mr. CARR, and agreed to.

Mr. CARR then re-introduced his amendment as an original motion. Mr. TAYLOR proposed as an amendment that the meeting be not adjourned, but that it were thought desirable by the shareholders to have the mine inspected, the directors should afford every facility for such an inspection taking place. He was sure the directors would have no objection.

Mr. NASMITH was very glad to hear that the directors were willing to do as this. They could not conceal the fact that there was some dissatisfaction outside, but he thought it would be better if they could all act together.

lling one way and the shareholders another.——Mr. MORRIS ex- similar terms, and said that if any of the dissatisfied shareholders ey could visit the mine in company with the two proposed in- , and personally hear their report.
reholders thought it desirable not to go to a vote on the subject if , but rather that it should be understood that the mine should be any formal resolution on the matter.——Mr. KERSLEY could not would be derived from the meeting being adjourned, since the re- rs would be printed and sent out to the shareholders.——Mr. CARR putting the resolution in the form he had done was that he not only something wrong in the mine, but something wrong in —The CHAIRMAN then put the motion and amendment to the latter was carried by a large majority.
gested that Capt. Williams of the Van Mine, and Capt. J. Paull d be called on to inspect the mine. He thought they could not and both were above suspicion.—This suggestion was agreed to. hen proposed that it was desirable to hold half-yearly meetings, d in August.—This was also agreed to.
votes of thanks then brought the proceedings to a close.

ENRY TIN AND COPPER MINING COMPANY.

inary general meeting of shareholders was held at the te-street, on Monday, for the reception of the report ttee of shareholders appointed at the last meeting,

Colonel O'MAHON in the chair.

the notice convening the meeting being read, the the director present declined to proceed with the meeting so long as representatives of the press were After a scene of indescribable uproar, amid which the the committee (Mr. A. H. Gunn) was called upon to t, the Chairman pointing out to the reporters the ex- their absence (which, as is usual under such circum- ced but little effect), the notice convening the meeting

CHAIRMAN then said that Mr. Hilliard and himself gave their ence to the presence of the press, and were most desir- at everything should be done for the best interests of the com- and that their proceedings should have the utmost publicity. GUNN, previously to reading the report of the committee, stated that minutes hope of every day's proceedings; and that, although the report was signed bers, each member had had due notice of every meeting. AY, who represented Mr. Fernandez, stated that illness was the client's absence when the report was signed. the committee had acted under legal advice, having taken coun- all they had done.
member of the committee) said they had taken the precaution bers should form a quorum.
complained that neither he nor his colleagues had been allowed the report, which was, at least, an unusual proceeding. then read. It contained various statements and charges relative and subsequent progress of the company. It alleged that 800*l.* the directors, although only 67*l.* had been expended on the mine; the petition for winding-up the company should be dismissed, reason to believe the property was a valuable one.
every reason to believe the property was a valuable one.
, the accountant appointed by the committee to examine the minutes of the proceedings of the committee. The auditors' re- the directors had never been properly qualified by holding shares , and that the charges for preliminary expenses were excessive

COURTENAY said it was due to his client, Mr. Fernandez, to state that he original directors, nor had he received any shares whatever from Mr. Fernandez joined the board at the instance of one of the directors, would be beneficial to the company. The moment Mr. Fernandez the slightest doubt about the fees he handed them back to the there was the slightest doubt about the matter he had not referred to Mr. Fernandez ——Mr. GUNN said the committee had not referred to Mr. Fernandez report.
read the opinion of Mr. Renshaw as to the qualification of the di- which was to the effect that they were legally bound to take the number mentioned in the Articles of Association.
GUNN said that they were advised the shareholders should for their own immediate steps for the dismissal of the petition. The committee duty, and it was for the shareholders to say what steps should be taken.
(a director) charged the committee and also the accountant with te, and disreputable suppression of plain facts. The shareholders that the directors had received 800*l.*, and that only 67*l.* had been ex- mine. What were the facts? Under a contract for the purchase which contract was registered with the prospectus, the preliminary be the first charge upon the funds subscribed—those preliminary to 450*l.* Mr. Conly, who was a director up to October, was pre- meetings, and urged that these expenses should be paid at once. of the proceedings another must unseemly uproar ensued.
proceeded to observe (amid considerable interruption) that the met with Articles of Association, under which these various sums had not one penny had passed into the pockets of directors; and ent was as necessary as that on the mine. Mr. Gunn, the Chair- mittee had not paid one sixpence for his shares.——Mr. GUNN said ion of vendor.——Mr. HILLIARD: And Mr. Grant, another member , held five shares—that was the extent of his vast holding.——Mr. Mr. Hilliard, never paid five farthings for your shares.
said that 767*l.* had been actually expended for the purposes of the not to the extent of a single penny was any amount drawn from by any director until there was a general confiscation threatened, and gainst the board was that that they had taken their petty fees.
G. TAYLOR proposed that the report of the committee be received and that the committee be requested to continue their services.——Mr. C. seconded the proposition.
CHAIRMAN objected to put the motion, upon the ground that neither Mr. nor himself had been allowed to see the report, and because the special meeting, as stated in the notice, was "to receive the report" only. first authority in the land the board was legally constituted, and to do was in the interest of *bonâ fide* shareholders.
COURTENAY appealed to those present, as business men, to adopt some course to promote the true interests of the company. He suggested the com- should deliberate to see if it was not possible some course could not be that would be productive of good results, and without taking any action ard to the directors. The committee might mature a scheme to be sub- to the shareholders, for upon cool reflection it would no doubt be found the had not done anything antagonistic to the interests of the shareholders.
CHAIRMAN: Certainly not.
objected to such a course, and was only astonished at the pertinacity of the directors stuck to their office.
SECRETARY said that Mr. Hilliard a few days since tendered his resigna- therefore, it was clear he was prepared to retire, which removed one of that had been raised.
GRANT asked the board if it was their desire the committee should proceed to the winding up?——Mr. BATT (the solicitor) presumed that with the instructions received from the board.
HALEY said he was quite willing to act in any way that would assist in the interests of the company; but since the last meeting he had received relative to the statements made by the committee and the posi- had rendered it impossible for him to yield—as a matter of utterly impossible. Counsel of the highest eminence had been upon the matter.——Mr. GRANT gave the Chairman an assurance that a committee's report should be sent to him.——The CHAIRMAN accepted objected to submit the proposition to the meeting, the special that it was for the receipt of the report only.
was put by the mover and carried, the CHAIRMAN protesting against such a course, when the meeting separated.

ANGLO-BRAZILIAN GOLD MINING COMPANY.

eneral meeting of shareholders was held at the London ppegate-street, on Tuesday,

Mr. S. LLOYD FOSTER in the chair.

DAWSON (secretary) read the notice convening the meeting.
CHAIRMAN said this meeting was called in confirmation of the held on Jan. 23, when *pro forma* resolutions were passed for winding-up pany. The result of the circular asking the shareholders to subscribe fur- been that out of the 560 shareholders only 88 had replied, repre- 15,513 shares; 33 of those 88, representing 7965 shares, were willing to sub- further capital—a little over 1000*l.*; but 55, representing 7550 shares, ex- opinion that the company should be wound up. This, however, did not one of the largest shareholders, including Mr. Hardie and himself chairman who between them represented 12,000 shares, who were perfectly ble to see whether there was anything of value in the mines, but latest application necessitated the winding-up of the present com- ents, in its present form. He had, therefore, simply to propose that passed at the last meeting be confirmed.
DAWSON seconded the resolution.
HARDIE asked if the plant had been valued?——The CHAIRMAN said he amount would be returned to the original shareholders.
PITTELL. That would be *nil*, he was sorry to say.
CHAIRMAN said the plant and stores were of considerable value, but the they would realise very much depended upon the way in which the liqui- carried out.
was put and carried, with one dissentient.
Hill, Attrill, and Hardie were appointed liquidators, with a remune- each.
HARDIE said he had been for many years the largest shareholder in this Company, Mr. Hardie being the next largest. He had lost some 5000*l.* or 6000*l.*, but there was the hope that something might yet come back to the His experience had been this, and it had been that of others—that sons very often did not succeed in the first instance, but that a few forward and for a mere bagatelle would secure all the advantages upon which 100,000*l.* or 200,000*l.* had been expended. One reason accepted a liquidatorship was that he hoped with the co operation shareholders, including Mr. Hardie, to come forward with a scheme, plan exactly, for continuing the development of the property. named it with all openness, his object being to see if the present could not recover a portion of their loss. Whatever the scheme might word that every shareholder should have the opportunity of could not do more. All he could say was that if his business en- mitted he should go to the Brazils, when he would be able per- time into the matter. At present he was only speaking from hear- say evidence; but, whether he went to Brazil or not, he would not join in any scheme in which the shareholders were not offered full benefit. (Hear, hear.)
A vote of thanks to the Chairman and directors terminated the proceedings.

[For remainder of Meetings see to-day's Journal.]

KULU, AND THE SILVER COUNTRY OF THE VAZEERS.

The beauties, antiquities, and silver mines of Vazeeri-Rupi appear to be ample, judging from the admirable and interesting account of them furnished by Mr. J. CALVERT (of Kulu), to command the attention of both travellers and miners, and the opportnnity afforded by the inauguration of an influential English company for European capitalists to assist in transferring a portion of the great argentiferous wealth of the Punjaub to the pockets of shareholders in this country is one not likely to be lost sight of. For some years past the author of the volume* now under consideration has been resident in India, and from the large number of observations recorded, and vast amount of useful information, it is evident that he has not been idle. Mr. Calvert had become somewhat acquainted with the mineral wealth of the Himalayas when employed by Government, some years ago, to search for coal in Cashmere, but the Maharajah of Cashmere and the authorities of Chumba, also an adjoining independent State, discouraged the discovery of minerals, or virtually threw obstacles in the way of the mines being worked.

The silver mines of Manikarn have long appeared in the maps of Vazeeri-Rupi. This excited Mr. Calvert's attention, and after some disputes about the right of search or prospecting the Government very handsomely waived their claim to the mineral rights, provided the Rajah would make terms, which with some difficulty was at last effected. Government also granted a lease of the famous Shigri Mine, which has never yet been worked. The lode is antimony, from 15 to 20 ft. wide, of solid ore, capable of yielding 45*l.* per ton clear profit. The mineral lodes in Vazeeri-Rupi consist of silver-bearing lead and copper lodes, and one or two of each were no doubt opened upon hundreds of years ago, but were built up and planted over to hide them from the Sikhs; and it has occupied over two years to trace out a few of the old workings and many more virgin lodes. Mr. Calvert expresses his indebtedness to the various officials and others who have aided his researches, and also to Dr. Oldham, chief superintendent of the Geological Survey of India and his assistants for verifying by chemical analysis his discoveries of the precious metals, especially in the numerous lodes of silver-bearing lead which will form the richest mines to be worked by the company now forming.

Ten easy marches, or about 115 miles north of Simla, is the capital and valley of Kulu, wherein are the sources of the Blue Beas River and its tributary sister the Parbutti. Kulu Valley is noted for much beautiful scenery which even Cashmere cannot equal, and for variety it certainly bears the palm. Starting from Simla, and describing some delightful scenery passed through in the intermediate valleys, Mr. Calvert takes us to the Largi rest-house, which is south of the Saing river and north of the Chata, and crossing the river by one of those picturesque little bridges so common in the country, and of which careful descriptions and illustrations are given, we are in Vazeeri Rupi. On entering the Kulu Valley it has rather the appearance of a deep khud, but soon opens out. Below this some 100 ft. is a brine spring, that should supply all the country round with that necessary of life—salt. But Government will not allow it to be worked without a duty of 3 rupees per maund lest it should oppose the sale of their salt, of which the Government keeps the monopoly—a policy we condemn in the Maharajah of Cashmere, but practise ourselves. The Rajah of Mundi has large salt quarries 30 miles from here, which supply all the valley, but pays no duty to the British Government, though it was lately proposed that he should. It is expected that the duty will be remitted off this, as the sale of it would only injure the sale of the Mundi salt, which is very impure stuff, and pays no duty.

Referring to the little village of Dilasni, Mr. Calvert remarks that he expects it is not so large as it was 300 years ago, when the miners from the copper mines above used to bring all the copper there to smelt, till that devil—choke-damp—frightened them all away. However, if you go up the adjoining khud you can pick up plenty of copper ore, which to the uninitiated shows itself in a lustrous green, or a bright gold-coloured metallic crystal, that has, like a golden Eve, lured more than one man to ruin and starvation, imagining he had found gold. Up above this khud, which exhibits the geological formation in a most interesting and distinct manner, is the village of Chisani, and above that numerous copper mines or indications, the green exudations from which show themselves for hundreds of yards, and bunches of ore have been worked out in many places to some little depth hundreds of years ago; the discovery of these workings originated in finding pieces of ore in the khud below. These are called the Bilan Mines, being in the Bilan Kothi, in Vazeeri Rupi, and have only lately been re-discovered. The valley is now open to the left, over the river, which soon becomes again deep below the road, and Mr. Calvert continues—"Notice the limestone formation, and those large blocks at the turning of the road, just past this nullah. What fossils are these? A mass of oysters, or what? Break off some, and send them to Dr. Oldham, and he'll put them on a shelf to bother someone else Mr. Warington Smyth kindly had a specimen I brought him cut and polished at Jermyn-street. He pronounced it not a fossil. The rock is composed of a mass of laminated formations, about the size and shape of a breakfast-cup. One might fancy them a mass of petrified jelly-fish." Then you go on, and the valley still widens; occasionally you will get a glimpse of the geological formation, which is very interesting, if you bear in mind that the part below is limestone—conglomerate of pieces of a similar rock to that above.

The mountain now on the right, high above, is Jamere (8973 ft.), and is literally full of copper, but you can't get at it from this side. Again, fine specimens of limestone conglomerate near the ferry, below Bedool village. Mr. Calvert says he was completely nonplussed, when he sent some of the red rock from this place to Calcutta, to be assured it was "veritable bricks and mortar." He don't believe it yet. Passing for awhile into Mundi territory, near the village of Nagoad, are some large iron mines, worked by the Rajah's people; the ore is iron-sand. The author then introduces us to some of the beauties of the Blue Beas and of Bajara, and subsequently leads us on to the village of Shumshee, near which gold is washed for in the river at certain seasons, but the abundance of large rocks in the beds prevents the sand being reached, and makes the success very small. Experienced gold washers could, no doubt, obtain gold enough from this river to provide an ample living, but they ask too much for it when they get it—never less than 15 rupees per tolah, impurities and all. It is a certain fact that all the rivers in the Punjab, excepting the Ravee, produce gold, the Indus in particular. In a previous communication—"Notes on the Mineral Wealth of India"—Mr. Calvert has pointed out the auriferous riches of the great Chinese white plain, just to the north of Kulu. One gold mine employs 1500 men, who are constantly working during six months of the year. On reaching the entrance to the Parbutti, the high mountain, Bijli (8070 ft. high), is seen; on the summit is a temple to the goddess of lightning.

After passing along a pleasant avenue of trees, and following the river bank, we cross the Maol Khud. Here immense blocks of copper ores have been brought down from somewhere ages ago. Sultanpur, the present capital of Kulu, is a place of some commerce every autumn; it is also the residence of Dhulep Singh, the present rae. The maidan, south of the city, has a fine appearance, and is kept free from buildings or cultivation, for the especial convenience of the devil-gods, munders, juggernauts, or davis, of which it is said there are at least 150 in the valley. They are maintained under the special protection of a benignant and liberal Christian Government, who will not permit a Christian to sacrifice his beef at Christmas lest the Juggernauts should take offence! After some further travelling we get to the upper Raini Valley. Here may be found some valuable gems if you know where to seek them, and are provided with proper tools and *patience* to cut them out of their stone matrix. Mr. Calvert has found sapphires there worth 2500 rupees each, besides other gems.

At last you reach the Futta Rine, and if you camp there you will get to the mines in about three hours easily. It had been known for many years, and especially by the natives that travelled this way, that large lumps of antimony were found on or near the road at the mining location in question; but the actual lode from whence these were carried periodically by the winter's ice and snow had never been ascertained. Having enlisted the services of a herd of Lahoue people, Mr. Calvert ascended the hill the first day, without more success than collecting a large quantity of loose pieces of ore, some of which were too large for their combined forces to move till broken up by sledge-hammers. Next day, higher up, he found indications which eventually led him to the exposed face of a lode of solid ore, from 10 to 20 ft. wide. This he soon opened, and every kilter was rapidly filled, and as much again over and over thrown down hill to the road, where it was collected, the refuse being abandoned and only the pure ore taken away—the stibnite, or sulphuret of antimony, and the red and yellow ores. This, when reduced to regulus, can be shipped home for 32*l.* per ton, including every cost, and sells here for 76*l.* per ton. After 18 months' delay the Government granted a lease on very liberal terms, and it is hoped, by means of capitalists at home, to commence working these mines very shortly. The Government generously forgave the usual stamp on this lease, it being the first mineral lease ever granted in Inda. Mr. Calvert's views with regard to this lode, and also as to the existence of another one higher up and further east, have since been verified by Mr. A. G. Young, who found a lode of black antimony, or stibnite, to the east higher up, and assures him that there are marks of where the lode was blasted. This was done by order of Major Hay about 18 year ago, and accounts for the quantity of loose ore found on the hillside. Mr. Young describes the new lode which Mr. Calvert opened as 40 ft. wide, the lode of solid ore in the centre being at least 20 ft. wide. This lode can be easily quarried without any blasting, being in laminated beds, easily separated by bars and wedges. The scorize or froth at the top of the lode is remarkable, consisting of the oxide (cervantite), a yellow mineral, and a bright red (kermesito), with some little iron. This lode is peculiar as exhibiting little or no gneiss rock blended with the ore, whereas the other lode of black radiating stibnite abounds in places with sulphuret of iron and crystals of zinc-blende—the whole penetrating the rock in places to a great depth, showing they must all have been at a time in a molten state.

Travelling from Sultanpur to Shumshee, the Parbutti River will be there crossed by ferry to Buin camping ground. The mountain above—Kot Kandi—is very rich in mineral, principally copper, which shows in numerous places, as also manganese and iron, and on the other side sulphur is found. Previous to turning the corner of the Parbutti River, on the right hand of the road, and a little above the foot of the hill, may be distinctly seen a huge mass of a copper lode, covered with the brilliant green exudation which ordinarily follows long exposure of rocks containing copper ore. Although copper may be found in several places up the mountain side, yet there can be no doubt, on comparing them, this piece of rock came from a huge lode high up over the top of that mountain, at the back of the village of Saond, but by what means it got into its present position is a problem indeed, as no volcanic action has been at work there to have hurled it such a distance over the ridge. In the hill above Gula Pani is a lead and silver vein, which no doubt if traced would prove larger further on. Above the village of Chong is the richest silver mine in the valley, near Chitrani; it was built up to hide it from the Sikhs, and has not been worked. Copper is also reported here in its native state—not as a sulphuret.

But notices of this kind might be extracted from any part of the volume, for it appears that the entire district is rich in mineral deposits, but these few extracts will suffice to show that there is an ample field for the profitable application of capital in mining enterprise. Mr. Calvert has told us where the most valuable mines exist, how to get at them, and how to enjoy the journey to them, whether that journey be made for business or for pleasure. That the necessary capital will be found for working them need not be doubted, and as each new vein is opened the interest in the book will increase. Mr. Calvert has succeded in writing a work which will, moreover, be scarcely less acceptable to the general reader than to the miner or geologist, for he has interwoven a vast collection of facts into an interesting narrative of travel, given in the most attractive style. The admirable illustrations of chromo-lithography add much to the amusement which the perusal of the book affords, and it may altogether be safely commended to all interested either in Indian matters or in mining.

* "Vazeeri-Rupi, the Silver Country of the Vazeers in Kulu: its Beauties, Antiquities, and Silver Mines; including a Trip over the Lower Himalayah Range and Glaciers." By J. CALVERT, F.G.S., M. Inst. C.E., author of "Notes on the Mineral Wealth of India." London: E. and F. N. Spon, Charing Cross.

THE COST-BOOK SYSTEM.

That justice can be more readily administered by a Court the officers of which are intimately acquainted with the particular branch of business in connection with which a dispute has arisen is so generally admitted among lawyers, that in more than one instance when an action or a suit relating to mining affairs within the Stannaries has been commenced in the Courts at Westminster the judges have ordered the matter to be taken before the Vice-Warden of the Stannaries, upon the ground that the points could be more justly dealt with in the Stannaries Court than by themselves; and, although the ruling of the Court has sometimes given dissatisfaction to those who have not come off victors, the justice of the decisions has seldom been questioned by impartial critics. With a view to render cost-book law more generally understood in non-professional circles, Mr. John Batten, jun., has prepared an annotated edition* of the Stannaries Act, 1869, with notes explanatory of its several sections, and with introductory chapters upon the jurisdiction of the Stannaries Court, the Cost-Book System, and similar matters; also with an appendix containing forms for the formation and regulation of cost-book companies, and for proceedings in regard thereto, which cannot fail to obtain extensive patronage.

The annotated reprint of the Act is preceded by three introductory chapters, the first explaining the jurisdiction of the Stannaries Court. The historical sketch with which the chapter commences will be of general interest, and the legal portion will similarly prove of great utility to all who have business in the Court. The Acts of William IV. and of the 18th Victoria are very fully referred to; and it is then explained that it does not appear that the Court ever claimed on its equity side an original jurisdiction in all respects conterminous with that of the Court of Chancery in general matters of equity; but it seems that, on the contrary, it exercised the jurisdiction with caution, and within certain, more or less, well ascertained limits. The cases in which the jurisdiction was exercised were, it is apprehended, almost entirely, if not altogether, limited in practice to matters relating to the management of cost-book mining companies. It is safe to state that the original jurisdiction has been exercised in order to enforce payment of contribution by a suit in the name of the purser or principal agent against shareholders for the sale of their shares; to enforce the lien of creditors by petition against the purser or principal agent, and to prevent by injunction the sale or removal of machinery and materials from the mine, and if need be to decree a sale and distribution *pari passu* among creditors generally; to compel a general account and contribution as between all the shareholders, and this without praying for a dissolution of the partnership; to compel specific performance of agreements for sale of shares; and to issue injunctions generally. The statutory extensions contain some peculiar provisions for service of process to compel appearance in any part of England and Wales in suits prosecuted according to the custom by pursers against adventurers for calls: in suits by creditors against pursers to enforce payment of their demands by sale of the ores, machinery, materials, or effects of the mine; and in suits for account between adventurers in mines.

Referring to the Cost-Book System, he remarks that it is almost impossible to give a succinct definition of it, and comments upon the judgment of the Master of the Rolls in the case of the Bodmin United Mining Company, remarking that "with great deference to the authority of so learned a judge as the Master of the Rolls the writer thought, not for an instance wishing to contend that the Cost-Book System as such ought to be taken judicial notice of by the superior Courts in the absence of evidence to show what its true nature is, submits that the system is of somewhat remoter origin than might be inferred from his lordship's words quoted: that in one or two of its leading characteristics it is perfectly well known and understood in the West of England, and may be traced back as existing as a customary form of partnership at least to the days of James II., and that there is a great difference between partnerships really working on the customary principle of Cost-Book, and partnerships pretentiously calling themselves cost-book companies for the purpose of evading the Legislature, and working by rules of their own, and differing from those universally implied by the custom of the West of England.

The remaining introductory chapter discusses how far the Stannaries Act, 1869, is retrospective in its operation, and then reprints the Act with very ample and judicious annotations. The appendix of forms includes the opening entry for the Cost-Book; form of declaration of trust of sett, and sets of forms applicable to winding-up. The book is altogether one of the utmost utility to all connected with cost-book mines, and one which should be carefully perused by every cost-book officer especially. Throughout the volume Mr. Batten displays a sound acquaintance with the subject on which he writes, and has entitled himself to the utmost credit for the manner in which he has performed the task he has undertaken.

* "The Stannaries Act, 1869. Edited with Notes explanatory of its several Sections, &c.;" also with Appendix containing Forms. By JOHN BATTEN, jun., B.A., Barrister at Law. London: Wildy and Sons, Law Booksellers, Lincoln's Inn.

GOLD MINING AND MILLING OF GILPIN COUNTY, COLORADO, UNITED STATES—No. II.

The correct calculation made upon the basis heretofore stated is the following:—

100,000 tons at per ton		$35 =	$3,500,000
In gold per ton	$20 =	$2,000,000	
In silver, the average relation to $100 in gold by 722 assays of all kinds of ores, $52·30 (say)	10 =	1,000,000	
In copper per ton	5 =	500,000 =	3,500,000
Saved in smelting ore 16 per cent. of gold		320,000	
Ditto ditto 16 per cent. of silver		160,000	
Ditto ditto 30 per cent. of copper		150,000	
Saved by milling, 66 per cent of gold		1,108,800	
Saved in alloy and by buddle, 50 per cent of silver		420,000	
Total saved			2,158,800
Total loss per ton		$13·41 =	$1,341,200

Under the best circumstances of milling and buddling the tailings.

Smelting Works now in Operation.—Mr. Douglas remarks that the Boston and Colorado Smelting Works have been in operation five years, "and under the management of Prof. Hill the enterprise has succeeded financially and metallurgically." It is no discredit to this concern to say that, by a course of astute direction, it has grown into a monopoly sufficiently strong to limit the production of smelting ore to its own capacity. As elsewhere stated by Mr. Douglas, there are many mine owners who await the advent of competing works in order that they may be released from dependence upon a sole purchaser at an unopposed schedule of prices. It would be easy to mention several mines which, if wrought to the extent of their capacity of production, as such mines are worked in California, Nevada, Australia, or Brazil, would readily produce sufficient smelting quality, each one of them, to sustain works of like capacity. Not, it is true, by hand selection, which separates but 5 per cent., but by mechanical separation, which would increase the smelting product to about 20 per cent. of the ores brought to grass. The distant reader, uninformed of the local surroundings, may wonder why such mechanical means of increasing the supply of furnace ores had not been brought into practice long since. In explanation, it must be remembered that the smelting works alluded to were projected and completed when the deepest gloom had settled upon the industrial interests of the district. Their construction was welcomed, and the new order of things came then into existence. Smelting ore was required, hence a separation of that quality by hand, as the cheapest and readiest, was commenced. The few then operating gladly reserved the best and sent the bulk instead of all, as formerly, to the stamp-mill. Gangs of miners out of work leased idle mines, upon which large expenditures had been made, and with no capital beyond their own labour contributed to the supply of the smelting works. The milling ore thus produced gave employment to another class, a few of whom owned mills, most of whom, however, rented idle mills, both undertaking to mill ores at so much per cord for all customers. Here were two classes of operators, distinct in interest, yet bound to hold a common purpose, both of which became auxiliaries to the smelting works.

To this tripartite alliance, neither member owning the mines excepting to a very limited extent, the influence of the supply and material men—the business community—very naturally gravitated, whereby a confederacy in interest was cemented which, for the most part undesignedly, operated necessarily for the sustentation of the system first adopted. The absence of local capital made this quite easy. Outside capital, already prejudiced, neither cared to investigate, nor dared to venture where opposition was certain to be encountered. Prometheus bound to the rock, vultures tearing his vitals unceasingly, would not be an inapt allegorical representation of the industrial interest of Gilpin county from 1867 to the present time.

Two other works were started, however, calculated for the reduction of the same quality of ores—the Chloridising, and the Western Smelting Works. The first was the venture of one who, as a workman in California, had learned the practical part of Plattner's process. Upon a very limited capital he undertook the work of competition, whilst also his furnace and vats were to him a laboratory for experiments in the saving of silver and copper, not a part of his practical education in California. It is proper to remark that the works were finally a success metallurgically, but, under the circumstances, could not be so financially. The caving-in of the furnace after nine months or a year's operations closed the works. The Western Smelting Company undertook the work of erection, purchase of ores, and reduction, on a capital of $5000. A struggle for nearly a year completed the establishment, and it started greatly in debt. A second-hand engine broke down, and so did the company. The smelting was entirely successful, and the cost per ton less than that of the Boston and Colorado Works. With these exceptions the latter enterprise has had no competition, and is, doubtless, one of the most profitable establishments of the kind in the world.

Present Financial Position of Mining and Milling.—Under this heading Mr. Douglas quotes the conclusion of Mr. Reichenecker that the "gross receipts from rock of the first-class are about 36·24 per cent., and from rock of the second-class about 32·13 per cent. of their total assay value in gold, silver, and copper," and adds this remark—"The best evidence of the unparalleled richness of these mines is that, despite the loss of 66 per cent. of their mineral, so many have been for years worked to advantage." In this regard the following may be relied upon:—

1.—Previously to the last year no ores assaying less than $25 per ton in gold and silver paid a profit, hence no mine was worked the ores of which did not assay beyond that value.

2.—That during the last six years the great bulk of the ores raised came from mines reckoned as second-class, but few of the first-class being operated.

3.—That in this time an average of 100,000 tons had been milled annually—say, 600,000 tons—the product of many mines, since not one was worked in the large way, that the mill bullion shipped east, the smelted product, and the proved losses in the flow of the mill, and also from the buddle, properly estimated, will show the value of the ores of Gilpin county to be greater than that of any other mining district yet worked.

The cheapening of supplies since the completion of railroads to Denver, in 1870, has reduced the cost of working appreciably; this reduction in material supplies is made still more advantageous by the completion of the line to Central City, hence the example of cost given by Mr. Douglas is not now a correct calculation. As an instance, the Leavitt Mine, at a cost of $8 per ton for mining and milling, produces a profit of $2 per ton on milling ore, and about $4 per ton on smelting ore. If every dollar was saved from the rock its assay value would be about $17·60 per ton in gold and silver. The ordinary loss by milling will put the value of the ore beyond $25 per ton as it comes from the mine. Here there is a profit on a second-class mine, which, if worked two years back, would have netted a loss. The mill product of first-class mines, as the Kansas for instance, reaches $18 and $20 per ton at present, a profit of, perhaps, $12 per ton, notwithstanding the loss is increased in proportion to the increased value of the ore. In none of these cases is the value of the copper calculated, which may be reckoned at from 1 to 1½ per cent. in all the milling ore. That which is contained in the furnace ore is, of course, saved, but not always accounted for to the owner of the ore. The ordinary calculation will show that such ores are worth over $35 per ton, not including the copper. The history of mining in Gilpin county will, therefore, very clearly demonstrate three facts important in themselves:—

1.—An extraordinary capacity for production.

2.—The ores of second-class mines, not including copper, are worth over $25 per ton.

3.—The ores of first-class mines, not including copper, are worth over $35 per ton.

Proposed Alteration in the Mode of Treatment.—Under this, as a part of the last quoted heading, Mr. Douglas says that "The remedy lies in the mechanical concentration of the second and third-class ores, the abandonment altogether of the battery amalgamation, and the smelting of the whole produce." It has cost the absolute waste of $10,000,000 in Gilpin county during the last seven years to crystallise this idea. It is recommended that—

"The ore should be carefully assorted by hand, and a separation made, not only of the first class, as at present, from the poorer vein stuff, but of the iron and copper pyrites from the galena and the blende."

Although the bulk of ore raised is too poor in galena or in blende to make it always desirable or profitable to subdivide the first class there are special mines, and at times specific deposits in most mines, wherein there is sufficient of one or both of these metals to render it advisable to follow out this direction. The separation of the pyritous matter, however, from the gangue should be as close as possible, whether done by hand and mechanically, or wholly by machinery. When smelting commenced the very nature of the treatment demanded the metalliferous portion of the ore to be as free as possible from gangue, hence, as has been remarked, only the richest mines afforded as much as 5 per cent. of smelting ore, the poorer none at all, and the ordinary mines 2 or 3 per cent. The pyritous matter, which was associated with a disproportionate percentage of gangue in the best mines, and that which was generally interspersed throughout all ore raised, remained undisturbed until pounded in the stamp mill. This hand selection was a step in the right direction, and surely indicated the propriety of making a thorough separation: but as this could not be done without very seriously interfering with stamp-mill profits and overstocking the safe limit for controlling the smelting of the county, besides requiring machinery, it has not yet been attempted. The experiments made in 1870 by the Krom Dry Ore Separator not only illustrated the importance of a close separation, but also how easy it is for a combination of interests to prevent the introduction of an innovation hurtful to that combination. The machine which demonstrated the principle in actual practice, and was a practical success, failed to gain the support of those "convinced against their will," because "they remained of the same opinion still."

The first experiment was made by a model machine on tailings of poor quality—

	Gold	Silver
Tailings before separation, per ton	$ 6·20	$ 4·81
Headings of separation, per ton	25·83	10·85
Tailings of separation, per ton	—	1·76

32 3-10ths per cent. of pyritous matter was separated out of 41 7-10ths contained in the original tailings, leaving in the machine tailings but 9 4-10ths per cent. of pyrites, in which there was no gold, and but a small portion of silver.

The practical working experiments were made by full-sized machines, driven by steam power. The ore was crushed by rollers, but not sized, as should be done for close working. The following mines furnished 13½ tons of ore, from which all first-class or smelting ore had been hand-selected out:—The Burroughs, Roderick Dhu, Prize, Gregory, and Bobtail.

Ore before separation assayed, average	Per ton $ 27·76
Headings of separation, average	110·70
Tailings of separation, average	8·33

From each of the five lots of tailings a large sample was taken and put through again, after being sized by sieves, with the following result:—

		Gold	Silver	Total
No. 1.—	First tailings per ton	$9·30	$4·42	$13·72
	Second tailings	1·65	91	2·56
No. 2.—	First tailings	8·26	2·73	10·93
	Second tailings	1·44	0·81	2·25
No. 3.—	First tailings	2·48	1·14	3·62
	Second tailings	1·24	1·04	2·28
No. 4.—	First tailings	3·10	1·17	4·27
	Second tailings	1·65	0·42	2·07
No. 5.—	First tailings	7·23	1.82	9·05
	Second tailings	2·06	1·17	3·23

Average assay of first tailings	Per ton $8·33
Average assay of second tailings	2·47

The first-class ore was taken out by hand more carefully than usual in order to test the working of the machine most thoroughly. The following statement demonstrates that the second-class, or mill-ore, contains nearly 17 per cent. of the same class as that selected out by hand, hence over 20 per cent. of smelting ore, instead of only 5, the result of hand selection.

No. 1.—Headings	1221	Tailings	1804	all 3025
No. 2.—Headings	767		4833	5600
No. 3.—Headings	464		5076	5540
No. 4.—Headings	1310		5341	6651
No. 5.—Headings	768		5442	6210
	4530		22,496	27,026

Percentage of headings, or smelting ore, 17 nearly. In this example 13½ tons, worth $374·08, were concentrated into 2¼ tons, worth $249·07, leaving in the tailings $103·71, a discrepancy of $21·30, it being quite impossible to show exact relations where many lots are assayed. A re-working of the tailings changed $103·71 to $27·78—a loss in the tailings of about 8 per cent.

Besides showing that a mechanical separation of the ores of Gilpin county would provide smelting ore to about 20 per cent. of the gross amount brought to grass, the use of these machines show that a loss need not be incurred equal to 10 per cent. on the average when rich ores are treated; a larger percentage always with poor ores. Mr. Douglas risks no reputation in advising that preference be given to water dressing, saying—"Dry concentration is strongly recommended, but where water is accessible it will in most cases be better to adhere to the well-understood system of water dressing." It would have been in excellent tone with his article if he had candidly stated that he did not understand the "dry concentration;" and, therefore, his calculations were based upon water dressing. It is stated that in Hungary the allowance for loss is 15 per cent., to which Mr. Douglas adds 5 per cent., and calls the loss 20 per cent. If this is the best that water can do, it is absolutely inferior to the result of dry concentration by the Krom machine, as the following additional examples will show:—

1.—Galena in the ore	Per cent. 5·80
Blende in the ore	23·28
Loss in tailings, galena	0·87
Loss in tailings, blende	2·75
15 per cent. in galena, and 11 per cent. in blende.	
2.—Sheba silver ore, Nevada	Per ton $ 244·29
Headings	1236·11
Tailings	26·09
Loss in tailings not quite 11 per cent.	
3.—De Soto silver ore, Nevada	Per ton $ 153·61
Headings	1316·27
Tailings	19·14
Loss in tailings not quite 13 per cent.	
4.—Mammoth lode, Nevada, galena	Per ton $272·55
Headings	469·36
Tailings	34·78
Loss in tailings, nearly 13 per cent.	
5.—Bates common mill ore (unsized), per ton ...Gold $20·67	Silver 7·44
Left in tailings ... 2·58	2·65
Loss in gold, 12½ per cent.; in silver, 35 7-10ths per cent.	
6.—Georgetown silver ore (sized properly).	
407½ tons, practical working	Per ton $54·22
Left in the tailings, by assay	3·91
Loss in tailings, 7½ per cent.	

It will be observed that a low value of silver makes a high loss per cent. in the tailings, although the actual loss per ton is small. So many particles will remain in the ore mass, whether of one metal or another, since no clean separation can be effected. The fine particles of silver sulphide are extremely light and difficult to save closely. It is, of course, eminently proper for a conservative writer to recommend dressing by means of water, but it would be most unwise to adopt it on the large scale in Gilpin county on gold ores. Even if the loss by dry concentration is as great as by wet, and the cost as much, there are three advantages in favour of the former:—

1.—Any location can be used that is convenient, air being the medium.

2.—Ice, frost, nor slush offer no hindrance at any season.

3.—When the tailings should be re-ground fine and amalgamated, dry concentration admits of it readily and conveniently, whereas concentration by water does not. When 20 per cent. is to be left in the tailings of $25 ore the waste is excessive.

It will also be found that water dressing can only be carried on as a distinct metallurgical operation, in a special establishment of large dimensions and area, requiring skill and close attention. All the ores must bear the cartage to and from this establishment, whereas the air-machines can be put up at any mine, and conducted by unskilled workmen.

Mr. Douglas concludes his really valuable paper with a statement to show the profit to be made out of $20 ore treated as indicated. The calculation assumes the payment of $47 per ton as the smelters' margin. No one able to put up works of concentration would tolerate a cost so largely beyond a legitimate price for this work. But his statement in full, contrasted with one which is entirely practicable, will best show what can be made out of a class of ore which Mr. Douglas says can readily be produced to the extent of 1000 tons daily from mines now open in Gilpin county:—

Wet Concentration.

"Mining and hauling 50 tons at $6 per ton	$300	
Handpicking and concentrating 50 tons at $2	100 =	$400
10 tons of concentrate containing 40 ozs. gold	$800	
10 tons of concentrate containing 60 units of copper	300 =	$1100

The smelter should pay for ore containing 40 ozs. of gold, 6 per cent. of copper, and probably 20 to 40 ozs. of silver, at least 60 per cent. of the value of the gold, and 50 per cent. of the value of the copper, therefore the receipts of the miner would be—

60 per cent. of the value of 40 ozs. of gold	$480	
50 per cent. of the value of the copper	150 =	$630
And as the cost of producing and concentrating would be		$400
The profit on 50 tons of 1 oz. gold would be		230
Or $4·60 per ton."		

By Dry Concentration, &c.—

Mining (no hauling) 50 tons $4 per ton	$200	
Dry crushing and concentration, $150 per ton	75 =	$275
6 tons of concentrate (not 20 per cent. on such poor ores (containing in gold and silver		$800
6 tons concentrate, containing copper		200
Value of ore concentrated		$1000
6 tons cost of smelting, at $25 per ton	$150	
Cost of preparation, as above	275=	425
Profit on $20 ore, including copper		$ 575
Or $11·50 per ton.		

As a general thing, $20 ore will not yield beyond 12 per cent. of headings, and is not likely to contain as much copper as given in the last statement. By the method proposed, when the smelting is either done by the concentrator, or a sufficiently liberal cost allowed, as above, $10 per ton can be realised out of $20 ore, of which the mines of Gilpin county could readily produce 10,000 tons daily.

MINING IN CALIFORNIA.—A correspondent of the San Francisco *Daily Bulletin* of Jan. 9 writes:—I estimate that within the next 30 days a million dollars will be washed from the gravel now in the dump-yards of the several drift claims I have lately visited in this and adjacent counties, being material accumulated since the close of the last water season. The North America Company, at Hepsidam, will alone wash out $150,000; the Bald Mountain Company, at Forest City, $100,000; and various other of these claims from $20,000 to $50,000 each. This is not guess-work, each of these companies knowing exactly how many carloads of gravel they have out, and within a small fraction of a dollar how much each one will yield.

THE SWEETLAND CREEK AND THE BIRDSEYE CREEK CLAIMS.—Each comprise a considerable area of good mining ground, covering, as is usually the case with the better class of hydraulic mines, a portion of the old river channels, so prolific in gold, and so generally met with in this part of the State. They were bought several years ago, at reasonable figures, and have, I believe, steadily paid handsome dividends since. They are in excellent shape and extremely well managed, the Sweetland Creek being under the supervision of George D. McLean. This company has been put to a heavy expense of late in running a long bed-rock tunnel, now nearly completed, and which when brought into use will materially increase their current revenues, by enabling them to wash a large body of rich gravel lying too low to be run off through their present tunnel. The facilities here for thorough washing are quite unexampled, Sweetland Creek, at this point a wild and rocky glen, along which the sluices are set, having a descent of 1000 ft. in a little more than 1 mile. Along this distance many abrubt and craggy falls occur, varying from 30 to 100 ft. in height. Over these the gravel, borne by a powerful current of water, is precipitated, and dashing against the jutting rocks on its way down strikes the bottom with great force, thoroughly disintegrating and washing it clean from all adhering particles of gold. To save the gold thus released and aid in further setting it free a well-devised system of sluices, under-currents, and similar contrivances have been placed at every available space along the creek, so that the gravel, by the time it reaches the Yuba, the great tailrace into which everything is discharged, has been made to give up about all the gold it contained; and if the business of washing were everywhere conducted with as much thoroughness as here at Sweetland, the working over of tailings would scarcely prove a profitable occupation.

THE LITTLE YORK ESTATE, but lately disposed of, if it has even yet been actually transferred to its new owners, is another vast aggregation of interests and properties, consisting of hydraulic and drift claims, ditches, water franchises, saw-mills, timber lands, &c., the whole making up a domain princely in its proportions, and capable, under full development, of a very large and profitable production. Here, again, our English friends made a good investment; or, if they think differently, they will meet with no trouble in turning over their property to parties in your city, who are prepared to give them a handsome bonus on the price paid for it.

THE NORTH AMERICA.—We come now to consider the North America, exclusively a drift claim, and concerning the condition and prospects of which a few of the English shareholders, as would appear from certain communications in the London *Mining Journal*, entertain some uneasiness. I can see nothing to warrant this, for a more promising or well conducted property does not exist in the State. It is possible, of course, for parties to pay too much for even a good property. I have no idea as to what this mine may have cost the present owners, but if they bought it for less than $500,000 they got it at such a bargain as could not be duplicated here at present. This claim, or rather group of claims—for it comprises several large company locations—embraces an area of several hundred acres. Underlying this tract is a section, more than a mile long, of one of the most famous of all our old river channels, being that which enriched the entire State creek basin, at the head of which these grounds are situated. This mine was bought by the London company about one year ago, at which time they came into possession of it. There seems to have been two main sources of trouble from the start; first, a failure on the part of the company to provide a sufficient amount of working capital to put the property in condition to be operated to advantage, and more especially to collect and preserve for steady use the water, of which they own the sources of an abundant supply; and, secondly, the practical loss of almost an entire working season by their coming into possession at such a late period as to preclude getting in necessary supplies, except at great cost, as the snow usually falls here to a great depth early in the winter. Had these two causes of trouble been avoided or obviated, as might easily have been done, our English friends would have been in receipt of dividends from their mine some months earlier than, under the circumstances, was possible. As it is, they may look for a liberal ... the next 30 days, since their superintendent, having now plenty of ... able at once to make a heavy clean-up, and hereafter the North America ... counted upon to take its place in the rank of free and steady ... mines. This company are now working 125 men, giving employment ... their practice throughout the year, to every suitable man applying ... they are taking out gravel from but one of the three tunnels run into ... removing about 10,000 car loads per month, which yield at the rate of ... over $2 per car load. The gross revenues of the mine, as worked ... therefore a little over $20,000, of which labour bills absorb one-third, ... rent expenses (say) one-sixth, leaving more than one-half of the gross ... go to the amount of net profit. How much this company has lost ... year from their failure to supply an adequate working capital at the ... inferred from the fact that an equal amount of gravel might with ... been extracted from each of their other two tunnels had funds been ... fit them up and economise the water. This company need not be ... material; they may attack it with all the force at their command, ... outlast any of their number. They ought at once to appropriate ... sums to collect and store up every available drop of water, so that ... be washed as it comes out, and then increasing three-fold their ... force, as recommended by the experts who advised the purchase of the ... proceed to push operations in the most energetic and exhaustive ... such an administration the North America would prove itself one of the ... ductive and best paying mines on this coast.

From the foregoing it will be seen that English capitalists, however ... may have suffered from their mining investments elsewhere, have ... in California, they having, besides the above, made several other ... in other parts of the State.

FOREIGN MINES.

DON PEDRO NORTH DEL REY (Gold.)—Telegram from ... Produce for December, 6595 oits.; weighed to January 18, 1532 oits.

MALPASO GOLD WASHING.—The directors have received ... gram from their general agent, advising a remittance of gold of ...

EL DORADO (Nova Scotia).—The directors are glad to ... shareholders that they continue to receive very satisfactory accounts ... perty. That, after paying for all winter supplies and necessaries, the ... three months' working to Dec. 31 last left a profit of 394 ozs. of gold ... them to declare a dividend of 5 per cent. on the paid-up capital, which ... vious payments, is at the rate of 20 per cent. per annum. The above ... be payable on the 20th inst.

MAMMOTH COPPEROPOLIS OF UTAH.—Telegrams from ... intendent state that they are taking out 8 tons of ore a-day; as this ... yield a profit of 10*l.* per ton, it would give about 240,000*l.* a year ... while it is estimated that 58,000*l.* per annum will be derived from the ... soon as the mill is in operation.

CHONTALES.—The directors have received advices ... Smeddle, *via* New York, dated Jan. 4. Gold returned for December ... ore crushed, 1828 tons, which produced 339 ozs.; and the arrastre ... Value of the gold, 1099*l.* 10s.; cost for the month, 845*l.* 10s., which ... charged to construction account. Health of the establishment good.

BIRDSEYE CREEK (Gold).—Telegram from the ... Powers: "We have cleared up after a run of 30 days. The gross ... $10,250; the expenses—including $1000 cost of tunnel and shaft ... profit is $6000. The amount of outstanding bills now paid was ...

CRESCENT (Gold).—Capt. Stetson, the superintendent ... of Jan. 17, writes as follows: "The water is down to the top of the ... the third level this morning; hope to be able to fix it in three days ... will commence to hoist ore from the first and second levels. I have ... 300 tons of fair ore broken ready to hoist. I want to start the mill ... the pump had worked as I had expected I should have had the ... month ago, and been crushing ore by Jan. 1. We have had considerable ... during the past month, but no snow, although there is plenty ... around.

EMMA.—Telegram from Salt Lake, Feb. 10: Mine in ... ing order; forwarded no ore this week to New York; raised ... 260 tons at railway depôt; 560 at mine; breaking road; commence ...

BATTLE MOUNTAIN.—Capt. Richards, Jan. 16: ... being driven north looks very favourable; it is producing some ... ore, which is very encouraging. The drift from Daniel's winze is ... and yields some good ore. In the 73 ft level north there is no ... week. Hooper's rise, in the back of the 73, is producing some ... have resumed stoping in the back of the 37 ft. level where formerly ... known as Pascoe's; it is yielding some very good ore, although ... gangue, and requires a deal of assorting: 251 sacks raised during ... making 4718 sacks ready for shipment.

BENSBERG.—Mr. J. W. Hoffman, Feb. 8: This week we ... menced driving two levels from the opencast, one north and the other ... from the surface. The former has been driven 6 ft., and shows very ... for dressing. In the latter, which is in softer ground, we have not ... anything worth saving, but we expect some good results after ... ther 12 ft. We also commenced removing the sand from the top of ... at the west end. There are about 15 ft. of sand to remove, which ... until the end of this month. We have had further deliveries of the ... are waiting for the shafting, as we cannot place the various parts ... The water is decreasing a little. Production of ore—carbonate, ... assay, 40 per cent.; rock ore, 20 tons; average assay, 10 per cent.

WEST CANADA.—Jan. 8: Wellington: The lode in the ... the bottom of the 35, east of Bray's shaft, is smaller than it has been ... yielding 2½ tons of copper ore per fathom.—Huron Copper Bay: In ... the back of the 60, east of Bray's shaft, the lode will yield 2 tons of ... and in the stope in the bottom of the 35, west of Palmer's shaft, the ... 3½ tons per fathom.

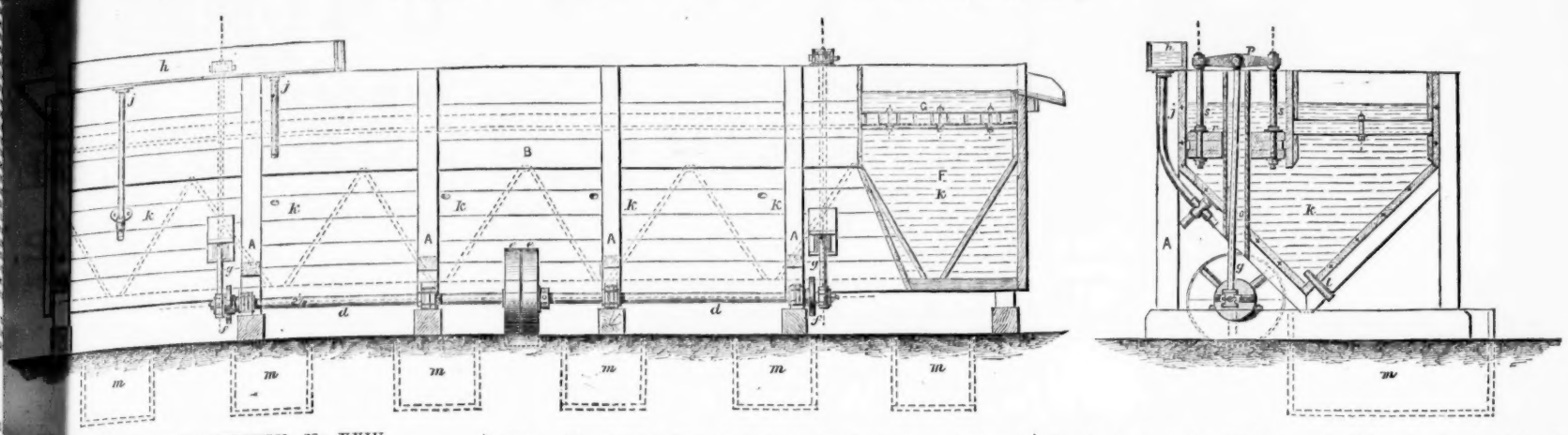
LUSITANIAN.—Jan. 28: Palhal: In Taylor's engine-shaft ... below the 160, the lode is worth 2 tons per fathom. The shaftmen ... trip-plat at the 160.—Levels on Basto's Lode: The lode in the 160, east ... is yielding 2 tons of ore per fathom, and in the 150, going in the ... 1 ton per fathom. In the 160 west the lode is worth 1½ ton per ... 150 west the lode has become poor, and we have reached the slide. ... 130, east of River shaft, is 4 ft. wide, composed of quartz and flookan ... the 120 east is 6 ft. wide, containing stones of ore. In the 90 east the ... wide, composed of flookan and schist. In the 80 east the lode is ... no value. In the 70 east the lode is 4 in. wide, of flookan; we have ... men back on another branch to see if we can find anything better ... in the 38, west of the slide lode, is worth ¾ ton per fathom.—Mill Lode ... east of Taylor's, the lode is 6 in. wide, giving stones of ore; and in the ... slide lode, west of Perez' shaft, the lode is 8 in. wide, yielding stones ... Lode: In the 140, south-west of Taylor's, the lode is 1½ wide, composed ... and schist, and in the 130, south-west and north east, the lode is ... same character. The adit cross-cut, south of the branch, west of ... being driven in a fine hard gneiss rock.—Winzes, &c., on Basto's ... No. 92 below the 70, east of River shaft, is going down in a lode ... posed of quartz and spots of lead. The lode in winze No. 93, below ... of Taylor's, is worth 5 tons of ore per fathom. The lode in the rise ... against winze 86, is 4 ft. wide, yielding stones of ore and mundic. ... Cross-cuts: The 60, north of incline shaft, is in dry and more ... the 60 south the ground is without change. This cross-cut is ... bruary. The great lode in the 60, east of incline shaft, is 1 ft. wide ... quartz. The adit level, west of incline shaft, is being extended ... wide, of quartz and spots of lead and mundic.

[For remainder of Foreign Mines, see to-day's Journal.]

USEFUL MINING APPLIANCES.—The snows in Cottonwood ... Utah, have been very heavy this year, and the slides have occasioned ... and property. There has been some difficulty in transporting the ... count of the snow, and although mining operations have not been ... rupted, the snow has seriously retarded operations in the vicinity. ... of labour is required to keep the roads open, and some mines are ... up. According to a correspondent of the Utah *Mining Journal*, the ... staff, and Vallejo Mines were last week the only ones in a condition ... He speaks in high terms of the wire tramway on the Vallejo, which ... of ore as quietly and easily as if there were no snow in the world. ... will, we think, be very generally adopted in the future by those who ... summer to probable difficulties in the winter. It is also of course ... summer, and saves hauling expenses in rough and mountainous ... of ours on the Pacific Coast are. Whatever the objections may be ... cost, there is little doubt that they are of great value and convenience ... do their work well. The wire tramway, which belonged to the ... Aurora Company, and which carried the ore from the mine to the ... work satisfactorily when first erected, but it eventually performed ... success. Several of Hallidie's patent wire-ways have been erected ... we understand have given great satisfaction. There is no doubt ... localities they are almost indispensable, when it is desired to work ... winter. At the Flagstaff Mine, in the canyon, a system of snow boats ... ore from the mine to the road has been adopted, which is said to work ... snow boats are run on the same principle as cars on an inclined ... loaded one in its descent drawing the empty one up the hill by means ... pulley. An improvement noticed by the correspondent mentioned ... the Emma Mine, of having a hydraulic ram at a spring at the foot of ... tain which forces water up to the mine in sufficient quantities for ... cooking, washing, drinking, &c. Strange to say this simple device ... in places where it could be applied as well as not; and in other places ... little trouble it could be arranged to work a steam-engine is considered ... Economy and common sense are, however, being practiced by mining ... dents to a much greater extent than fomerly, and with an increase of ... ness in our mining districts.—*Mining and Scientific Press* (San Francisco).

LAPIS-LAZULI MINES.—The method of extracting the ... is sufficiently simple. Under the spot to be quarried a fire is kindled ... fed by dry furze, is made to flicker over the surface. When the ... sufficiently soft, or, to use the workmen's expression, *narm*, it is ... mers, and flake after flake knocked off until the stone of which the ... is discovered. Deep grooves are then picked out round the lapis-lazuli ... crowbars are inserted, and the stone and part of its matrix are ... workmen enumerate three descriptions of ladjword. These are the ... colour; the asmani or light-blue; and the suvsl or green. Their ... in the order in which I have mentioned them. The richest colours ... the darkest rock, and the nearer the river the greater is said to be the ... stone. The search for ladjword is only prosecuted during winter, ... labour in the mine being compulsory, the inhabitants are less injured ... in a season of comparative idleness than when the fields require ... Perhaps, also, during the cold of winter the rock may be more ... action of heat, and thus be more easily reduced than when it ...—*A Journey to the Source of the River Oxus.*

ORE DRESSING MACHINERY.



ORE-DRESSING MACHINERY—No. XXIV.

CONTINUOUS SIEVE PISTON JIGGER.—This jigger has been designed for the treatment of copper, lead, zinc, and mixed ores. The apparatus consists of a hutch, *B*, 20 ft. long and 5 ft. wide, a continuous sieve, *c*, 20 ft. long and 33 in. wide, driving-gear, composed of shaft, fast and loss riggers, *e*, adjusting discs, *f*, *f*, and two piston-rods, *g*, *g*, water-launder, *h*, delivery-pipes, *j*, pyramidal-shaped chambers, *k*, discharging-plugs, *l*, and receiving-boxes, *m*. Each of the two pistons, *s*, plays through a close wooden launder, *o*, 4 in. square, and is connected to a cross-head, *p*, which takes the piston, *r*, by means of bolts, *s*. The piston is formed of three sets of planks, each 1½ inch thick, kept together by means of light bolts and nuts.

The sieve-bottom, *C*, consists of wove wire, stiffened in the following manner:—A central longitudinal bar, *t*, ½ in. thick underneath the wire, a grid of wooden slips, 2½ in. deep, the slips inserted in a frame, and a second central bar, *u*, set over the grid. The wove wire is wired to the grid, and the bottom rendered firm by bolting the two longitudinal bars, *t*, *u*, together. The water to the chambers, *k*, is regulated by shifting strips of iron on the pipe-holes in the bottom of the launder. The piston-speed, horizontal, and vertical flow of water is proportionally the same in this as in shorter piston-jiggers, the width of the sieve is also lessened for very fine sand. An inclination of ⅜ in. is given in a length of 20 ft. The dressing capacity will depend upon the character of the stuff to be treated; but if the ore be tolerably heavy, the waste light, and the grains 1 to 3 millimetres in size, from 1 to 2 tons per sectional inch of sieve may be dispatched in a period of 10 hours. By placing the driving-gear at the bottom of the hutch, the tremulous movement in the framework is lessened, and the sieve and piston rendered accessible at every point.

12, *Coleman-street-buildings, London.* JOHN DARLINGTON.

HORSLEY'S BLASTING POWDER.

The Government announcement in last week's *Mining Journal* of conditions upon which this explosive may be stored and used will be received with much satisfaction by miners, both at home and abroad; for the compound, whilst admitted to be the safest of the nitro-glycerine compounds, is so manufactured as to retain an amount of power immensely greater than that of gunpowder, and far in excess of many of the new blasting compounds recently introduced, and as compared with dynamite, its only real competitor, it has the inestimable advantage of not being affected by cold, so that warming or thawing never becomes necessary, and consequently such lamentable accidents as those which have from time to time occurred whilst preparing dynamite for use need not be feared; indeed, some trials were made a few days since at the Drybrook Ironworks, and the holes having been drilled the Horsley's powder was put in without any preparation whatever in order to show that the hard frost did not in the slightest degree interfere with its firing, and it may be mentioned that the ignition of the charges was effected by an electrical battery of a novel kind, and which proved perfectly successful, and certain in its operation.

The Patent Blasting Powder, which is the invention of Mr. John Horsley, F.G.S., of Cheltenham, analytical chemist to the county of Worcester, who has for upwards of 16 years made explosive compounds a special study, with a view to ensure greater safety and economy in their use; and the material now officially known as "Horsley's blasting-powder" appears to be as nearly perfect as need be desired. It is not granulated like ordinary gunpowder, but consists of a loose mixture of finely-powdered nutgalls and chlorate of potash, which, although of itself explosive, and about five times stronger than gunpowder, has its properties materially increased by the incorporation of a small quantity of nitro-glycerine (about 20 per cent.), which is completely absorbed and retained, without exuding, as in the case with other similar compounds. It can be stored in a comparatively small compass, and will retain its properties unimpaired for any reasonable length of time in any climate. It is also perfectly safe for transport, as proved by the fact of its having been conveyed to India, and other distant places, by sea and land, during the hottest weather. Compared with the best gunpowder used for blasting purposes, Horsley's blasting-powder is found to be, weight for weight, eight times more powerful, and as this increased power is combined with absolutely diminished danger to life and limb, its importance to miners is obvious. Fewer and shallower bore-holes are required for performing a given amount of work, the storage and transport of the material is more economic, and, though last not least, the miner effects a considerable saving of time, since owing to the absence of sulphurous and nitrous fumes work can be resumed almost immediately after the explosion of a charge, which in the ordinary course of workings involves a loss of several hours.

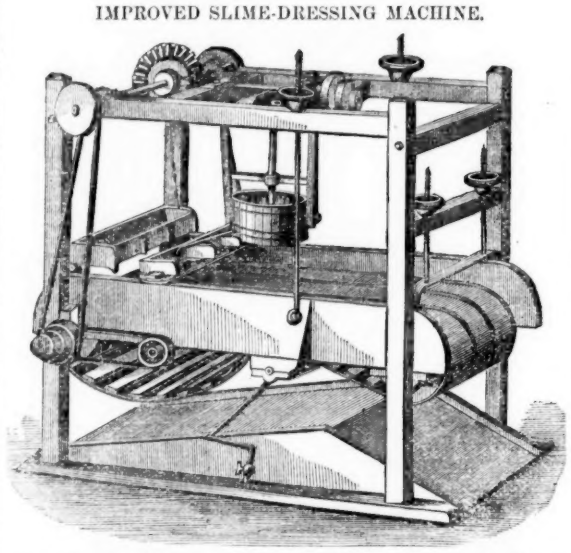
The manufacture of Horsley's blasting powder is conducted with perfect not more safety than common gunpowder, whilst the by-products, resulting from the waste materials, are converted into articles of a highly profitable character, which tend further to reduce the original cost of the powder itself. In order to explode the powder a new patented system of firing has been adopted, which entirely obviates all danger from ramming or tamping the charge in the ordinary way of using gunpowder. The cartridges for mining are formed in a waterproof form, so that when the requisite number of the charges have been inserted in the bore-hole, a similar sized cartridge with a firing tube projecting from its centre, containing a proper length of fuse, is placed on the top of all, and the hole filled up with sand or water previous to applying the fire. An excellent site has been already secured for the works; it has ample water-power, facility for sea and railway carriage, and approved of by the Inspector of Gunpowder works, so that the powder will shortly be in the market as an ordinary commercial product; and as Horsley's blasting powder has been thoroughly tested and approved by mining captains in various localities it will doubtless be very generally employed for mining purposes.

ECONOMIC GENERATION OF STEAM.

It has long been accepted as a principle by a large number of practical men that one of the most ready means of obtaining the largest available quantity of work for each pound of fuel consumed is to reproduce the condensed steam into the boiler, so as to avoid unnecessary waste of heat even after the steam has done its work in the engine; and it is this principle which is involved in the invention of DAVID PARSELL, of Saundersfoot, Pembrokeshire; he proposes, to recover, to utilise the waste steam and heat in such a manner as to prevent either noise or the discharge of thick vapour and steam. The condensation of the steam is effected by the use of currents or jets of air, and currents or blasts of heated air are injected into the furnace to urge the fire and promote combustion. The coal, particularly when anthracite is used, is heated or annealed in an adjacent chamber before being introduced into the furnace. Mr. Parsell is satisfied that by the adoption of his invention the difficulties encountered in burning anthracite for locomotive purposes will be removed. Notwithstanding the great purity of anthracite its density necessitates a special method of burning it, and although many arrangements proposed have been very ingenious they have generally been found of too complicated a character to admit of general adoption.

The hot products of combustion rising from the fire are, according to Mr. Parsell's invention, carried through the boiler into two or more auxiliary boilers, where they heat water or other fluid. They are by preference carried up through one tubular boiler, and down through another from the boilers the heated products pass into a heater, or otherwise, and the spent products escape therefrom. He employs a tubular condenser, the air from which passes into the heater, taking up heat from the escaping products of combustion is forced into the furnace to urge the fire. The apparatus consists mainly of the number of chambers of collapsed-cylindrical form, placed vertically side by side and around the principal boiler, which is cylindrical. This central cylinder may be regarded as an upright tubular boiler with the fire-box at the bottom, but, in some cases, with the ash-box closed, so that the air to support combustion may be kept under pressure. The collapsed cylinders are provided with a similar tubular arrangement, and form the auxiliary boilers already mentioned. He connects the engine and boiler together by tubes or passages that the waste steam from the engine shall be condensed by air and serve for the boiler, whilst the air passing into the heater is heated by the boiler, and then injected into the boiler. The boiler furnace has a chamber, in which the fuel is heated or annealed before it falls upon the fire-bars, and Mr. Parsell states that when coal, other than anthracite, is used the annealer is not necessary. He is confident that with his invention every degree of heat is really utilised, and the steam can be supplied at 30 lbs., 60 lbs., or 100 lbs. per square inch as may be required. The chief object for condensing the waste steam in the manner described is to permit of the working of street tram-cars with steam, and likewise of traction engines on common roads, as with the invention applied the most crowded London thoroughfares could be traversed with steam-power, and without the slightest molestation to man or beast.

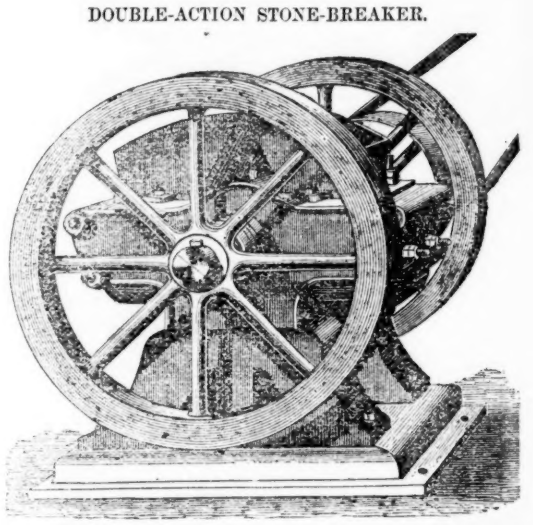
IMPROVED SLIME-DRESSING MACHINE.



The slime-machine, of which the subjoined is an illustration, is that manufactured by the New York Ore Separator Company, and which is at present attracting some attention. The construction of the machine, which is about 12 ft. long, is so simple that explanation of details will be unnecessary; it has an endless sluiced apron, which is hung upon rollers placed at each end of the framing. Immediately over the apron, about one-third of the way down, is the mixing tub, into which is conducted the slime, together with an adjustable flow of water. By means of properly arranged pipes, the mixed slime and water are conducted into the sluices of the endless apron. Directly over the roller, at the head of the machine, is a tank, which is supplied with clean water by pipes with adjustable gates or cocks, and attached to the front of this tank is an inclined projection, whereby the water that overflows from the tank is conducted to the endless apron. This clean water is splashed over by adjustable plunging blocks connected by a rod to an eccentric on the shaft which extends across the upper part of the frame. The endless apron, the inclination of which can be easily adjusted, is moved upward intermittently a few inches at a time by a ratchet-wheel and pawl, and this motion is so connected with the movement of the plunging-blocks, that whenever the endless apron is at rest clean water from the tank is splashed upon it. The endless apron is hung in a shoe which has a hinged joint about midway between the mixing tub and the lower end of the machine. This shoe, just above this hinged joint, is connected by adjustable rods to hand-screws, which enable the operator to form a still pool, to arrest the flow of the slime as it is washed down the sluices, and prevent a waste of metal as the tailings pass off.

The supply of ore as fed into the mixing tub; the quantity of water mixed with it; the discharge of the mixture upon the endless apron; the quantity and force of the splashes of clean water; the distance the endless apron travels with every movement; the intervals between its intermittent movements; the rapidity of its motion; the inclination of its sluices; and the depth of water in the still pool, are all regulated in such a way, by adjustments easily handled, that the operator has the work under perfect control. This control is indispensable; because each and all these things must be regulated at pleasure, according to the peculiar character of the ore treated, and according to its varying quality, When the endless apron is on its upward motion no clear water is splashed from the tank; so that the concentrated material which clings to the surface of the apron immediately below this tank is drawn up out of the way of the disturbance of the next splash; and, with two or three more movements, it is carried over the roller at the head of the machine. Then it partly drops into a receptacle; and as it passes underneath, what remains is washed off by jets of clean water driven against it under pressure from a perforated pipe. The uses to which this slime-machine may be put in cleaning ores are various. It can be used as a picking table; and many ores may be cleaned upon it which are not strictly slimes. Oftentimes it can finish up an ore at one operation, and receive the material directly from the stamps. And there are still other uses to which it may be put, and which will readily occur to every practical man.

DOUBLE-ACTION STONE-BREAKER.



The stone-breaker has now become almost as essential a part of a mining plant as the dressing machinery, so that it is not surprising that the ingenuity of inventors should be exercised to design improvements in detail calculated to render it still more efficient, and from the manner in which the double-action stone-breaker, which for some time past has been shown in operation at the Montpellier Ironworks, Walworth, has done its work upon the various samples of hard stone which have been broken in it, there can be no question as to its excellence. The crushing-hoppers are arranged on each side of the axle, and as the middle of the axle is enlarged to form a cam each hopper makes a stroke during a single revolution. In practice one hopper is arranged to break down the large to about 2 in. or 3 in. cubes, which are at once fed into the other hopper, and reduced to any necessary degree of fineness; and it is found that by this means a very large amount of work is done with much less power than usual.

The invention is technically described as consisting essentially in certain arrangements of machinery by which means ores, stones, and chemicals can be effectually and efficiently crushed and ground or pulverised, and at the same time gold extracted from quartz by the combination of a peculiar crushing or chewing and grinding action, such objects being effected by the employment of a club-headed squeezer, mounted loosely on an eccentric. From the configuration of the machine the bearings and other parts which might otherwise be injured by dust are well protected, yet there is no part which cannot be instantly got at for cleaning, lubricating, or other necessary purposes.

From the compactness of the machine, and the facility with which the several parts can be transported, it is believed the new crusher will prove of considerable importance in connection with mining enterprise in the colonies and abroad, and from the great facilities offered for working it with any available power, owing to the admirable manner in which the double-hoppers keep the machine evenly balanced whatever may be the speed at which it is running. With regard to the first cost of the machine, it is stated that it compares favourably with any in the market; whilst the attention which has been paid to the quality of the materials used, and of the workmanship, will ensure its durability. Although as yet but little has been done to make the merits of the machine known, fair progress has been made towards introducing, and it is anticipated that the result of practical experience will be to secure its extensive adoption.

COAL-CUTTING MACHINERY.—The new patent of Messrs. GILLOTT and COPLEY, of Barnsley, relates to certain improvements in the machinery or apparatus for cutting coal, described in a former specification, and consists of an improved mode of mounting the cutter-wheel. In carrying out the invention they form a bevel flange projecting inwards on the upper side of the cutter wheel, and they attach a corresponding retaining strip to the underside of the overhanging carrying bracket in such a manner as to allow the said internal bevel flange on the cutter wheel to revolve in the space between the said strip and the bracket, the wheel revolving freely on its centre and being kept to the cut by the combined action of the said flange and strip, whilst at the same time the driving pinion is prevented from forcing itself out of gear with the teeth in the cutter wheel as the periphery of the said wheel is prevented from springing by the said strip and flange.

By the invention of Mr. WM. K. BIRKINSHAW, of Derby, the machine gives motion to a horizontal revolving disc or saw, and is fitted on a travelling carriage with traversing gear for regulating the pressure of the disc or saw during its revolutions on the face of and in cutting into the coal to be worked.

NEW BORING INSTRUMENT.—Mr. A. PRINCE, of Trafalgar-square, Charing Cross (for J. VON SPARRE, Oberhausen), has patented a new or improved boring instrument. This instrument consists of an outer main tube or hollow cylinder, supported by a strap terminating with a vertical stem, on which are placed sloted guides for the stirrup of the borer; two wings set on a boss serve to prevent by their resistance the rotating motion of the stirrup itself while the instrument is in operation beneath the water. A second hollow cylinder holds the shaft to which the chisel or borer is fixed firmly or in one piece. This interior tube has a cross pin or slot, which gears in a slot cut in the outer cylinder. A third cylinder is likewise provided with a cross pin gearing in a similar manner. The instrument works under wafer, and is actuated by a wire-rope attached to a ring above the winged boss. By the continuous elevation and depression of these cylinders the chisel will be turned intermittently and the boring effected.

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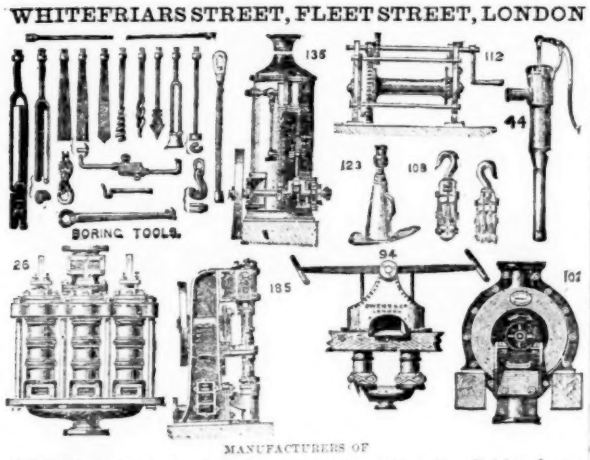

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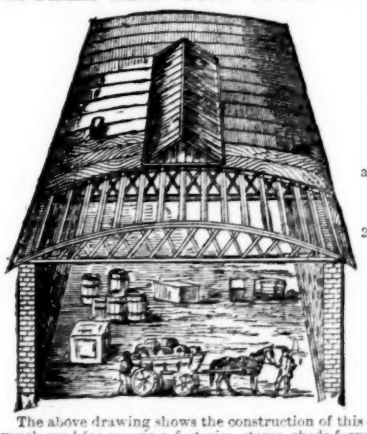

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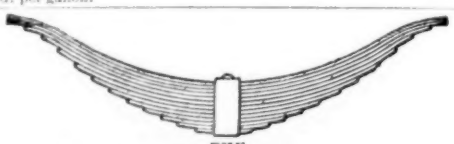

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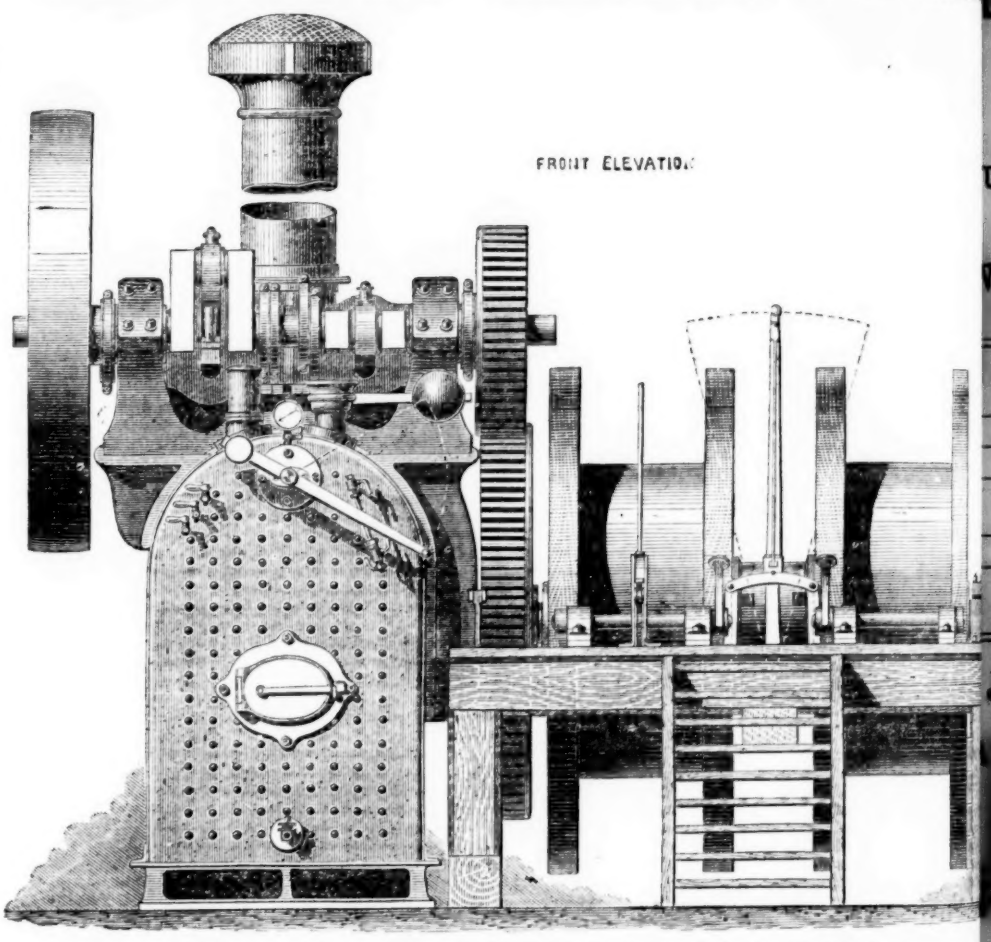

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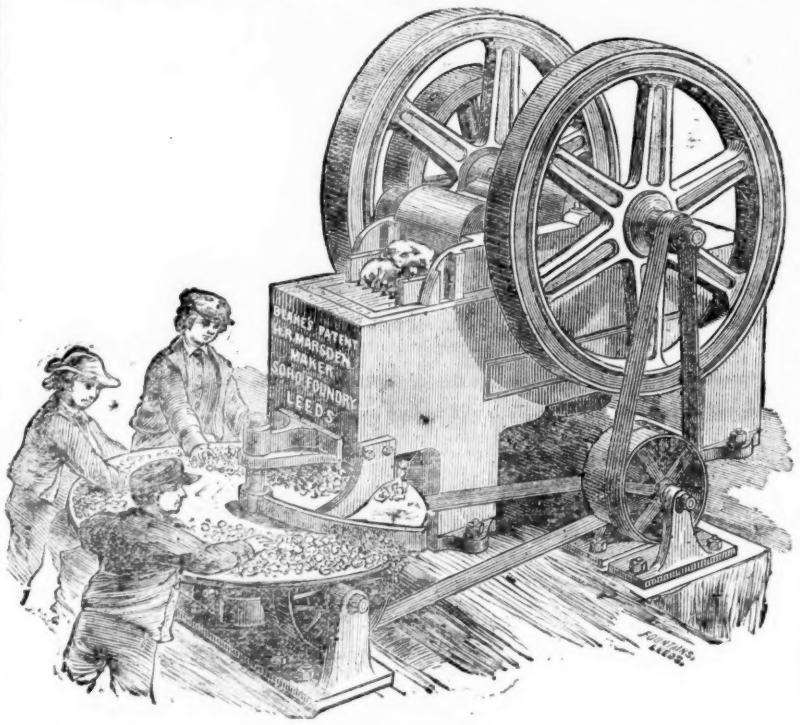

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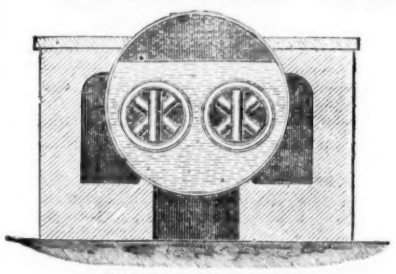

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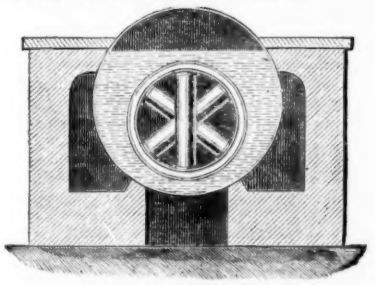

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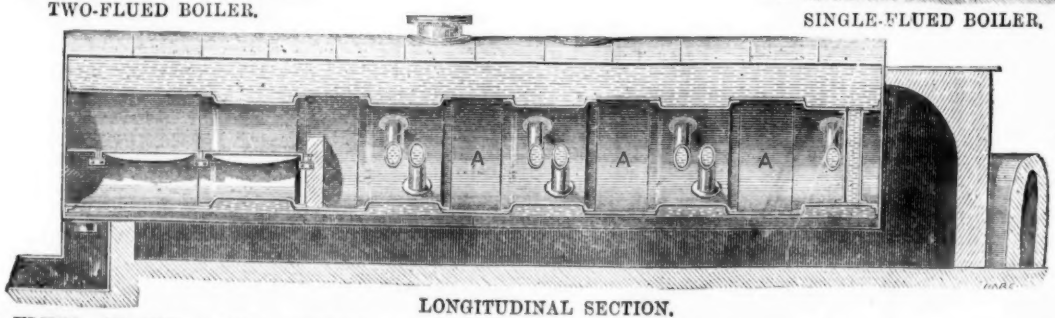

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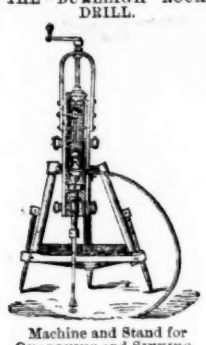

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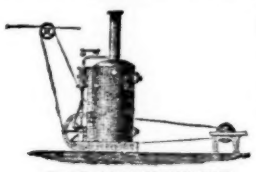

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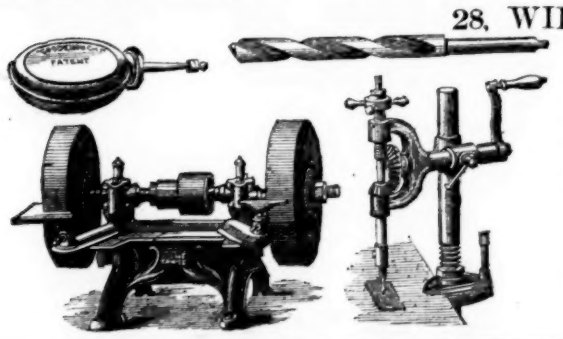

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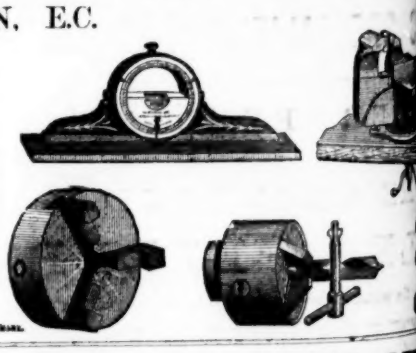

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